

Hennecke, Juliane; Pape, Astrid

Working Paper

Suddenly a stay-at-home dad? Short- and long-term consequences of fathers' job loss on time investment in the household

SOEPpapers on Multidisciplinary Panel Data Research, No. 1112

Provided in Cooperation with:

German Institute for Economic Research (DIW Berlin)

Suggested Citation: Hennecke, Juliane; Pape, Astrid (2020) : Suddenly a stay-at-home dad? Short- and long-term consequences of fathers' job loss on time investment in the household, SOEPpapers on Multidisciplinary Panel Data Research, No. 1112, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin

This Version is available at:

<https://hdl.handle.net/10419/226811>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

1112²⁰²⁰

SOEP papers
on Multidisciplinary Panel Data Research

Suddenly a Stay-At-Home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household

Juliane Hennecke and Astrid Pape

SOEPPapers on Multidisciplinary Panel Data Research at DIW Berlin

This series presents research findings based either directly on data from the German Socio-Economic Panel (SOEP) or using SOEP data as part of an internationally comparable data set (e.g. CNEF, ECHP, LIS, LWS, CHER/PACO). SOEP is a truly multidisciplinary household panel study covering a wide range of social and behavioral sciences: economics, sociology, psychology, survey methodology, econometrics and applied statistics, educational science, political science, public health, behavioral genetics, demography, geography, and sport science.

The decision to publish a submission in SOEPPapers is made by a board of editors chosen by the DIW Berlin to represent the wide range of disciplines covered by SOEP. There is no external referee process and papers are either accepted or rejected without revision. Papers appear in this series as works in progress and may also appear elsewhere. They often represent preliminary studies and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be requested from the author directly.

Any opinions expressed in this series are those of the author(s) and not those of DIW Berlin. Research disseminated by DIW Berlin may include views on public policy issues, but the institute itself takes no institutional policy positions.

The SOEPPapers are available at <http://www.diw.de/soeppapers>

Editors:

Jan **Goebel** (Spatial Economics)
Stefan **Liebig** (Sociology)
David **Richter** (Psychology)
Carsten **Schröder** (Public Economics)
Jürgen **Schupp** (Sociology)
Sabine **Zinn** (Statistics)

Conchita **D'Ambrosio** (Public Economics, DIW Research Fellow)
Denis **Gerstorff** (Psychology, DIW Research Fellow)
Katharina **Wrohlich** (Gender Economics)
Martin **Kroh** (Political Science, Survey Methodology)
Jörg-Peter **Schräpler** (Survey Methodology, DIW Research Fellow)
Thomas **Siedler** (Empirical Economics, DIW Research Fellow)
C. Katharina **Spieß** (Education and Family Economics)
Gert G. **Wagner** (Social Sciences)

ISSN: 1864-6689 (online)

German Socio-Economic Panel (SOEP)
DIW Berlin
Mohrenstrasse 58
10117 Berlin, Germany

Contact: soeppapers@diw.de



Suddenly a Stay-At-Home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household¹

Juliane Hennecke²

Auckland University of Technology, IZA

Astrid Pape³

Freie Universität Berlin

November 10, 2020

Abstract

Commonly described as the “gender care gap”, there is a persistent gender difference in the division of domestic responsibilities in most developed countries. We provide novel evidence on the short- and long-run effects of an exogenous shock on paternal availability, through a job loss, on the allocation of domestic work within couples. We find that paternal child care and housework significantly increase in the short run on weekdays, while we do not see any similar shifts on weekends. Effects are positive and persistent for fathers who remain unemployed or have a working partner, but reverse after re-employment. We also find significant changes for female partners as well as in the cumulative household time investments and the outsourcing of tasks, depending on the labor force statuses of both partners. We theoretically discuss time availability and financial constraints, relative bargaining powers, gender role attitudes, and emotional bonds as potential explanations for the effects.

Keywords: Job loss, paternal child care, fatherhood, domestic labor, intra-household allocation

JEL codes: J13, J22, J63

¹The authors are grateful to Clemens Hetschko, Mathias Hübener, Gail Pacheco, Marco Caliendo, Căzilia Loibl and participants at the VfS Annual Conference 2020, the IAREP Early Career (online) Workshop, the BeNA Summer Workshop 2020, the 1st Virtual Workshop in Applied Microeconomics (New Zealand), the SOEP Brown-Bag Seminar as well as multiple research seminars at Auckland University of Technology and Freie Universität Berlin for helpful comments.

²Corresponding author, e-mail: juliane.hennecke@aut.ac.nz, NZ Work Research Institute, Auckland University of Technology, 120 Mayoral Drive, Auckland 1010, New Zealand. ORCID ID: 0000-0002-8169-4862.

³e-mail: astrid.pape@fu-berlin.de, Freie Universität Berlin, School of Business & Economics, Boltzmannstr. 20, 14195 Berlin, Germany. ORCID ID: 0000-0001-7251-6645.

1 Introduction

In most developed countries men, on average, contribute less to domestic unpaid work than women (OECD, 2020). Although this so-called “gender care gap” can explain phenomena like the motherhood penalty and gender inequality in the labor market in general, there is no clear evidence on its origins and drivers (Samtleben, 2019; Petrongolo and Ronchi, 2020; Coltrane, 2000; Hook, 2010; Sanchez and Thomson, 1997; Bianchi, 2000).

In the past, the public debate and social science literature on labor force participation of mothers concentrated on external child care and left fathers as the more obvious in-house alternative aside. This has changed in recent years, as multiple European countries introduced father quotas to their parental leave schemes to encourage fathers to consider domestic work as an outside option (Elkins and Schurer, 2020; Averett *et al.*, 2005; Tanaka and Waldfogel, 2007; Tamm, 2019; Bünning, 2020). While fathers in countries such as Germany and Norway responded to these “daddy months”, the overall effect on paternal engagement beyond the short-term paternity leave take-up in general is inconclusive (see e.g. Bartel *et al.*, 2018; Bünning and Pollmann-Schult, 2016; Bünning, 2015; Schober, 2014; Schober and Zoch, 2019; Ekberg *et al.*, 2013; Patnaik, 2019; Pailhé *et al.*, 2018; Tanaka and Waldfogel, 2007; Nepomnyaschy and Waldfogel, 2007). Apart from financial reasons, organizational and workplace barriers and societal expectations (Twamley and Schober, 2019; Birkett and Forbes, 2019; Samtleben *et al.*, 2019; Brandth and Kvande, 2019; Naz, 2010; Bygren and Duvander, 2006; Geisler and Kreyenfeld, 2011; Averett *et al.*, 2000) as well as latent differences in preferences and gender identities have been found to matter for the housework and child care allocation within households (Vierling-Claassen, 2013; Álvarez and Miles, 2003; Stratton, 2012; Allen and Hawkins, 1999; Burda *et al.*, 2013; Lippmann *et al.*, 2020).

As low paternity leave take-up rates imply nonrandom selection, the estimated effects of leave-taking on paternal involvement are hard to generalize. If fathers who take up parental leave are more likely to be involved in care and domestic work also without a policy change anyway, it is not surprising that the estimated effects are rather low. Furthermore, paternity leave take-up is restricted to fathers of very young children and hence restricted in its external validity. Therefore, we approach the question from a different angle and analyze paternal domestic work independently of leave schemes. We ask the question of whether forced temporary inactivity in market work is able to change existing gender patterns in affected families in order to draw conclusions about the potential of extended periods of paternal availability for domestic production. Although unemployment itself is again selective with respect to paternal socio-economic characteristics, we argue that the involuntary nature of the change in paternal availability and the involvement of fathers of older children adds external validity to the paternal decision making itself. This change in the perspective on paternal involvement is very much in line with the discussion on the silver linings of the COVID-19 crisis with respect to potential shifts in gender norms due to the exogenous variation in paternal time spent with children in the household

during the crisis (Alon *et al.*, 2020; Kreyenfeld *et al.*, 2020; Mangiavacchi *et al.*, 2020; Hupkau and Petrongolo, 2020).

The goal of this paper is to analyze the effect of exogenous employment shocks through dismissals and firm closures on paternal involvement in child care and housework in the household. Based on the existing literature, we expect a positive effect and theoretically discuss four possible reasons: time availability and financial constraints, bargaining powers, gender role attitudes, and emotional bonding between fathers and children.⁴ All these mechanisms have distinctly different implications for the empirical analysis of short- and long-term effects as well as for the empirical analysis of the differences between working days and work-free days and between child care and housework involvement.

Our empirical analysis is based on extensive information available in the Socio-Economic Panel (SOEP, 2019), a large representative longitudinal household panel from Germany. The SOEP not only includes detailed socio-economic information but also surveys individuals' self-reported time use in multiple domains separately for working days (annually) and work-free days (biennially) over a time period of 26 years. We embed our analysis in an event study approach with individual and year fixed effects.

Our results reveal that fathers who experience an involuntary job loss immediately increase their time allocated to child care by 1.2 hours (58 percent relative to baseline) and to housework by 1.7 hours (79 percent relative to baseline) on weekdays. We do not find significant or robust changes in time allocation on weekends. Heterogeneity analyses reveal that the persistence of increases in domestic work is concentrated on fathers who remain unemployed and have a spouse who is active in the labor market. In contrast, we observe that the re-employment of fathers results in, on average, lower involvement in child care and housework on weekdays and weekends as compared to pre-job loss periods, especially if the partner is not working. Employed female partners respond to the change in paternal time allocation by persistently decreasing domestic time investments, while not employed female partners even increase the time allocated to child care and housework alongside their husbands. This results in an overall increase in cumulative household time investment in couples where both partners are at home due to the employment shock, while it causes a decrease in cumulative household time investment in couples where both partners work after a re-employment of the husband. These findings correspond with a decrease in external care use and expenses, indicating a decrease in the outsourcing of domestic tasks.

Most closely related to our study, Foster and Stratton (2018) analyze the effect of unemployment

⁴It has to be noted that the focus of this paper is on quantitative rather than qualitative changes in paternal engagement. For example, Kalenkoski and Foster (2008) show that considering differences between low and high quality child care is of high importance when discussing determinants and consequences of parental involvement. Thus, potential adverse effects of unemployment on the child care quality are discussed in Section 6.

and promotions on the intra-household division of housework using Australian panel data. They find that terminations and promotions of both partners affect the own time spent on housework and in case of a woman’s promotion also adversely affect the partners’ time spent on housework. In addition, they find that, in the case of promotions, the effects also hold when controlling for the paid work time of both partners, which is an indication of a change in the intra-household bargaining powers as opposed to time availability. Similarly, Fauser (2019) and Voßemer and Heyne (2019) both use German survey data and find significant short-run effects of individual unemployment on gender-specific tasks. While women are more likely to perform routine housework such as washing, cooking and cleaning after becoming unemployed, men are more likely to increase their activity in repairs and garden work following a job loss.

Our study makes three major contributions to the existing literature. Firstly, we consider child care as a major part of the domestic duties in households with children, while, to the best of our knowledge, all earlier studies neglect it.⁵ Secondly, we are able to analyze exogenous variation in paternal availability across the entire child upbringing. The existing parental leave literature can only provide evidence on a selective group of fathers of young children. Last but not least, we are the first to identify long-run effects of involuntary job losses on time investments as the studies mentioned above all concentrate on short-term effects.

2 Theoretical Considerations

Based on the existing literature, we expect a largely positive effect of exogenous job losses on paternal domestic involvement during periods of unemployment (Bünning, 2020; Foster and Stratton, 2018; Fauser, 2019; Voßemer and Heyne, 2019; Raley *et al.*, 2012; Lachance-Grzela and Bouchard, 2010). By extending the work of Bünning (2020) on paternal part-time employment, we identify four potential mechanisms behind this positive association: 1) time availability and financial constraints, 2) intra-household bargaining power, 3) gender role attitudes, and 4) emotional bonding between fathers and children. We, additionally, derive very distinct hypotheses from the four different theoretical explanations for the empirical analysis, which allows us to make statements about which mechanisms might be more reasonable in the analyzed context. Table 1 summarizes the hypotheses derived from these channels, which are discussed in detail in the following section.

Time Availability and Financial Constraints The most plausible mechanism behind an immediate change in paternal involvement in domestic work after a job loss is the simultaneous

⁵Neglecting child care in their analyses nevertheless has a couple of valid reasons such as the multitasking of child care with leisure, the potential biological differences in the efficiency with which child care is performed by men and women (e.g. breastfeeding) as well as the potential direct utility gained from the performance of child care tasks (Foster and Stratton, 2018). We will, thus, consider these differences between child care and housework in our theoretical considerations.

Table 1: Theoretical Hypotheses

	Persistent	Weekdays		Weekends		Partner spillover	
		CC	HW	CC	HW	NE	E
Time Availability and Financial Advantages	✗	✓	✓	✗	✓	✓(+)	✓(-)
Bargaining Power	✗	✓	✓	✓	✓	✓(-)	✓(-)
Gender Role Attitudes	✓	✓	✓	✓	✓	✓(-)	✓(-)
Emotional Bonding	✓	✓	✗	✓	✗	✗	✗

Notes: CC - Child care, HW - Housework, NE - Not Employed, E - Employed

change in time restrictions and financial constraints of the household. The job loss imposes an exogenous shock on the time a father is available for potential domestic duties and on the financial means available to the household.⁶ The increased time availability is expected to be directed to domestic duties if the father gains positive utility from performing them, e.g. enjoys spending time with his children or having a cleaner house, but especially if he has to cover tasks that cannot be covered by his partner or by external providers. The latter is particularly relevant if financial constraints force the family to increase the female partners' labor force activity or to decrease outsourcing. Thus, we expect a positive effect on paternal time investment during weekdays but potentially also on work-free days if tasks can be flexibly postponed (especially in the case of housework). These effects are expected to be largely non-persistent and observable during unemployment only. Based on the research by Chadi and Hetschko (2020), we may additionally be able to identify a reverse effect after re-employment if men have to invest more time and effort in a new job in order to signal or regain productivity. Time availability and financial constraints due to paternal unemployment are likely to also affect the female partner. An unemployed husband may induce (or force) his female partner to start working or to increase her working hours, which is likely to decrease her domestic work. On the other hand, financial constraints potentially have an adverse effect on female partners who voluntarily or involuntarily continue to be non-working. In this case, maternal domestic work potentially increases due to the decrease in outsourcing. The combined hours of domestic work by both partners should thus increase, especially if the female partner is not working, but also if she is working but not able to restore the pre-job loss level of outsourcing.

Bargaining Power Drawing on the Becker (1974, 1981) altruist model and the Samuelson (1956) consensus model on specialization and resource distribution within households, the theory of bargaining power is based on the underlying economic idea that the division of domestic labor is a bargaining process (Lundberg and Pollak, 1996; Couprie, 2007). According to this idea, higher wage income leads to higher marital power as it is associated with more control of the economic resources within the household, and household members are expected to use

⁶A reduction in financial means occurs if the female partner does not have the capacity to proportionally increase earnings (as shown e.g. in Halla *et al.*, 2020) and if social transfers do not cover the full income loss.

their relative power to negotiate reduced domestic duties. Thus, we expect positive effects on paternal time investment during weekdays and weekends, observable for both child care and housework involvement and accompanied by proportional decreases in maternal domestic duties. Nevertheless, this relationship might be less pronounced for child care as it is likely to also generate direct positive utility, especially for non-routine duties such as interactive care (Kimmel and Connelly, 2007; Sullivan, 2013; Bünning, 2020; Raley *et al.*, 2012).⁷ The persistence of these effects after re-employment largely depends on the length of the paternal unemployment and thus the extent of the persistent shifts in the men's workplace productivity, future earnings potentials, and comparative advantages in the household (Arulampalam *et al.*, 2001; Jacobson *et al.*, 1993; Eliason and Storrie, 2006).

Gender Role Attitudes A third channel comprises changes in the gender role attitudes within households. Multiple studies argue that women who participate in the labor force hold more egalitarian gender role attitudes while men who take up parental leave transform their attitudes toward equality due to the temporary exposure to a nontraditional division of labor (Cunningham, 2007; Arrighi and Maume, 2000; Davis *et al.*, 2007; Knudsen and Wærness, 2008). Therefore, we would expect an effect that is persistent and observable during weekdays and weekends for both child care and housework involvement and accompanied by a proportional decrease in maternal domestic duties.⁸

Emotional Bonding Lastly, a very prominently discussed mechanism in the public debate is the importance of emotional bonding between fathers and their children. Lower paternal involvement in the first months after birth may lead to lower emotional bonding with the child and thus lower parental engagement in later years (Doucet, 2006, 2009; Vierling-Claassen, 2013). If a job loss forces fathers to spend more time at home in the presence of their children, this might improve their emotional bonding and thus their future parental involvement (Brady *et al.*, 2017; Haas and Hwang, 2008). We would thus expect a persistent, long-run effect on paternal child care involvement which is observable during working and work-free days but no strong spillovers to female partners. We would additionally expect the effect to be heterogeneous with respect to the children's age, as emotional bonding is likely to be more volatile for young children.

⁷Studies in wellbeing research have found that the net affect generated by daily child care tasks is comparably low and not much higher than the one generated by housework (Kahneman *et al.*, 2004; Knabe *et al.*, 2010) which can largely be explained by very high levels of negative affect associated with child care, such as being annoyed or being stressed.

⁸As is argued, for example, in Bünning (2020), unemployment can have counteracting effects on gender role attitudes if a man attempts to restore parts of his lost "masculinity" by adopting even more traditional attitudes.

3 Data and Empirical Approach

3.1 Data: Socio-Economic Panel

Our empirical analysis is based on data from the German Socio-Economic Panel (SOEP) (see Goebel *et al.*, 2019, for more details). The SOEP is a representative longitudinal household survey conducted annually since 1984. The latest available data is the 35th wave in 2018. Over 30,000 individuals in 11,000 households participate each year, reporting on inter alia household characteristics, employment histories and time use.

We focus on fathers who are cohabiting with at least one dependent child up to the age of 14⁹ but we do not make any restrictions on the partnership status of these fathers as changes in marital status may be important endogenous drivers of the job loss effects. We reduce the risk of falsely identifying male household members who are not the primary father figure (e.g. adult brothers, grandfathers, uncles, etc.) by restricting the analysis to men who are either the household head or partner of the household head.¹⁰ This way, we are able to keep as many alternative household types as possible, such as single-father households, multi-generational households or patchwork families, and also allow for multiple different father figures.¹¹ Furthermore, we drop fathers who are younger than 18 or older than 65 and who have missing information on the main variables. Finally, and due to our fixed effects design, we require each father to be observed for at least two periods.

3.2 Job Loss

The SOEP contains detailed information on employment trajectories. Information on the labor market status is collected in every wave. If an employment spell ends within a survey year, respondents are asked to choose the reason for this job loss from eight categories, including plant closure, retirement, suspension, resignation, end of non-permanent contract, and dismissal by employer. In line with the earlier literature (see e.g. Foster and Stratton, 2018), we classify plant closures and dismissals by the employer as an involuntary job loss.¹² As the focus of our study is not on the job loss itself but on the unemployment spell initiated by it, a father is considered to be treated if he enters unemployment between $t - 1$ and t due to an involuntary job

⁹The cutoff at the age of 14 is based on legal restrictions on parental supervision responsibility in Germany.

¹⁰Of our sample, 1.6% are single fathers, 1.5% live in multigenerational households, and 4% are not the biological father of the child and hence live in a patchwork family (categories are non-exclusive). The results are not sensitive to removing these fathers from the analysis. Results are available from the authors upon request.

¹¹Note that, independent of the many different household types we consider in our data, we will still use the words “couple”, “family” and “household” as well as “partner”, “mother” and “wife” interchangeably in the following sections, although in some cases the households consists of different constellations than only the man and his female partner.

¹²In a robustness check, we only use plant closures as the most exogenous source of job loss and find that most of our results also hold for this group but we do lose estimation precision due to the low number of observed plant closures in our sample of fathers (308 plant closures compared to 902 dismissals). In particular, plant closures make it very difficult to track more long-term effects due to the small number of fathers who remain unemployed for more than one period after a plant closure.

loss. Thus, all treated fathers in our sample are unemployed at time point t , which we denote as "the time of the job loss" in the following. These fathers lost their job, on average, 4.7 months earlier.¹³ Men who report a job loss but are already re-employed in t are considered to be untreated. We will, nevertheless, discuss and analyze the potential endogeneity which is caused by this restriction in Sections 3.4. If fathers experience multiple job losses, all the job losses are treated as individual events.¹⁴ Additionally, couples in which both partners experience an involuntary job loss within the same period are excluded from our analysis. This results in a sample of 59,438 father-year combinations, in which 6,928 fathers are observed, on average, for 8.5 years. We are able to identify 1,210 job losses over the observation period.

3.3 Time Use

Our outcomes of interest are the number of hours fathers (and their partners) dedicate to child care and housework on working days and work-free days. SOEP respondents are shown a list of activities, which include paid work, education and training, leisure and physical activities, care (for children and other persons in need), and other unpaid domestic work such as errands, housework, and repairs and garden work. They are asked to indicate how many hours they spend on these activities on a normal day.¹⁵ For weekdays, this information is available for every year since 1992, while it is only collected biennially for Saturdays and Sundays.

Our main outcome variables are child care and housework, with the latter combining traditional routine housework (washing, cooking, cleaning), errands and repairs and gardening. We assume that these activities cover the majority of domestic duties in a standard household. We do not include care for persons in need in the housework measure as less than 3 percent of all fathers spend one hour or more on this task. Fathers who engage in this type of work may be a selective group and not representative of fathers in general. The reported hours for Saturdays and Sundays are combined by taking the average of both as a measure for time use on a normal weekend day.¹⁶

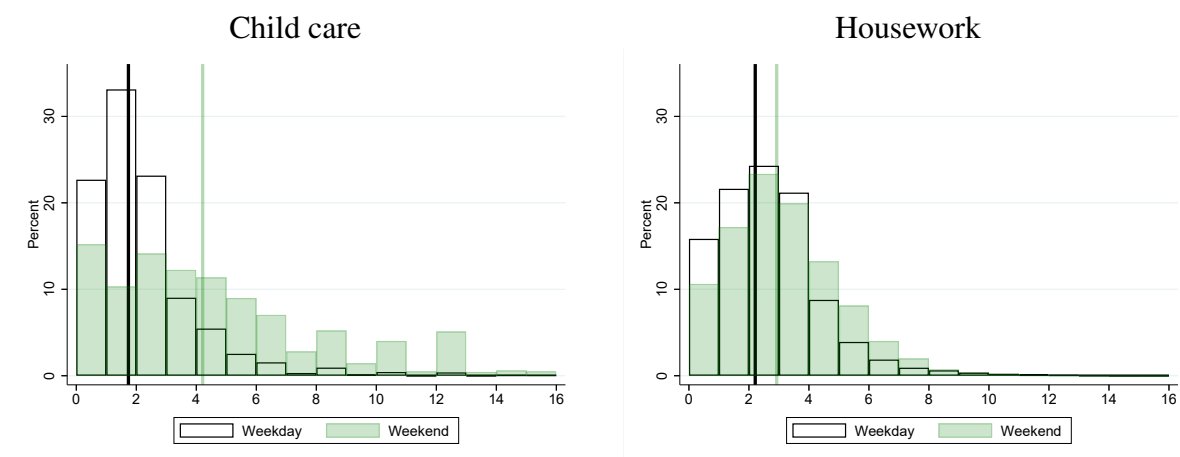
¹³The SOEP collects information on job losses occurring in the survey year and the previous year. In order to avoid duplicates, only job losses that occur after the interview in a given year are recorded in the following year. Although the majority of interviews takes place in April (s.d. 2.3 month), this design implies that for some fathers the first observation post-job loss is more than 12 months away from the actual job loss if their interviews lie more than 12 months apart. This is, however, only the case for 5% of our treatment group.

¹⁴Among all fathers, 20% experience multiple job losses over the whole sampling period. In order to test the risk of biases in our estimated effect due to job losses being influenced by earlier job losses, we conduct a robustness analysis in which we only consider fathers who experience only one job loss.

¹⁵Time use data derived from a single question is often subject to misreporting as the reported hours need not add up to 24 hours and are hence prone to conforming with social desirability (Bryant *et al.*, 2004). However, in order to identify the causal effects of job loss, the SOEP is still preferable to more detailed time diary data such as the European Time Use Survey (TUS), which does not contain information on why a job loss occurred, does not allow for a link within households, and also lacks the panel structure and sample size the SOEP offers. We account for some of the potential measurement error by using individual fixed effects and by controlling for a number of time-variant interview characteristics in all specifications.

¹⁶Fathers who report more than 16 hours of child care or housework, which is assumed to be an unrealistic amount of time, are excluded from the analysis in order to avoid potential outliers driving the results.

Figure 1. Paternal time spent on child care and housework



Notes: The figure plots the distribution of the paternal time use variables. The vertical lines indicate the sample mean.

Source: Own calculations based on SOEP v35, weighted.

Figure A.1 shows how paternal and maternal time allocated to child care and housework has evolved since 1992. It visualizes the persistent gender gap, which still amounts to over two hours on both weekdays and weekends. In Figure 1, we plot the distribution of paternal time allocated to child care and housework for all fathers independent of their treatment status. In addition, the first column of Figure A.3 plots the distribution of housework separately for the three components.

Although the variables are not continuous, we see that there is a fair amount of variation. Overall, fathers spend, on average, more time on child care than on housework but this difference is largely driven by the weekends, with the sample means of child care and housework on weekdays being very similar (approx. two hours as compared to, on average, four hours of child care on weekends). We also analyze the occurrence of zero reported hours, which might result in the requirement of a non-linear estimation approach. We find that 21% (13%) of fathers report zero hours of child care on weekdays (weekends) and 16% (5%) of fathers report zero hours of housework on weekdays (weekends). Additionally, we see in the data that a large proportion of the reported zero hours in child care are driven by fathers with older children. Thus, the share of zero hours for child care on weekends is only 4% for fathers with children aged 6 or younger.

Table 2 provides summary statistics of the key outcome variables and gives some first descriptive evidence on how time investments differ in the period pre and post job loss for the treated fathers. We can already see in this raw comparison that fathers invest more time on child care and housework post-job loss on weekdays. The average pre-job-loss time spent on child care increases from 2.00 hours to 3.20 hours in the first post-job-loss-period (during unemployment) and from 2.14 hours to 3.89 hours for housework. The mean differences on weekends are less distinct and not significant.

Table 2: Descriptive statistics: pre- and post-job loss

	Pre-job loss		Post-job loss		Difference
	Sample mean	N	Sample mean	N	
<i>Weekday</i>					
Child care weekday	2.00	779	3.20	1210	1.20***
Housework weekday	2.14	779	3.89	1210	1.75***
<i>Weekend</i>					
Child care weekend	4.50	399	4.62	601	0.12
Housework weekend	2.72	399	2.97	601	0.24

Notes: The table provides descriptive statistics. Standard deviations are reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

3.4 Estimation Strategy

The goal of our study is to identify the causal effect of an involuntary period of unemployment on time spent on child care and housework on weekdays and weekends. In order to achieve this goal, we address two potential identification problems: unobserved selection into unemployment and reverse causality. Firstly, although we only consider employer-initiated job losses, the job loss itself and especially the consecutive unemployment in period t may still be correlated with observed and unobserved characteristics of the individuals that also affect the outcome variables. Table A.1 presents basic descriptive statistics for our treatment group of fathers, who experienced involuntary unemployment over the sample period, and, in comparison, for the control group of fathers, who did not experience any involuntary unemployment spells. The table shows a number of differences with respect to observable characteristics between the two groups. As expected, the monthly net household income is lower for those fathers who experience a job loss. In addition, fathers with an involuntary job loss are selected in terms of education, the partner's labor force status, the number of children in the household as well as physical and mental health. With respect to child care and housework involvement, the average hours of untreated fathers are only slightly lower for child care during workdays and for housework on weekends but otherwise indicate no severe selection compared to the pre-treatment means of treated fathers (see Table 2). Besides these observable differences, fathers who lose their job and fathers who do not might also differ with respect to unobservable characteristics, such as their preferences and priorities for work and family life, which would lead to an omitted variable bias.

In order to overcome this potential omitted variable bias with respect to unobserved characteristics, we employ an event-study approach with individual fixed effects. This allows us to compare paternal time investments for the same individual before and after job loss and thus control for any time invariant observable and unobservable characteristics. It also reduces the risk of selection on time-variant characteristics, assuming that the within-individual selection is less severe than the between-individual selection. In addition, the individual fixed effects also account for differences in the reporting of time use, which are constant over time. We follow an

event study methodology as described, for example, by Schmidheiny and Siegloch (2019), and estimate the following equation:

$$y_{it} = \sum_{j=\underline{j}}^{\bar{j}} \beta_j b_{it}^j + \alpha_i + \alpha_t + \sum_a \delta_a \times \mathbb{1}_{age\ group\ i=a} + \sum_c \delta_c \times \mathbb{1}_{child\ age\ group\ i=c} + I_{it} + \varepsilon_{it} \quad (1)$$

where y_{it} is the outcome of individual i in time t , α_i and α_t are individual and year fixed effects, respectively, and δ_a and δ_c are age group fixed effects for the fathers and their youngest child, respectively.¹⁷ To account for time-varying misreporting, we additionally control for interview characteristics I_{it} . The vector I_{it} includes the survey mode (self-completed, orally completed, completed by proxy or translator)¹⁸ as well as the gender of the interviewer, which may impact the degree of misreporting due to social desirability considerations¹⁹. b_{it}^j is a treatment indicator for an event happening $j \in [\underline{j}, \bar{j}]$ periods away from t , which we define as:

$$b_{it}^j = \begin{cases} \mathbb{1}[t \leq e_i + j] & \text{if } j = \underline{j} \\ \mathbb{1}[t = e_i + j] & \text{if } \underline{j} < j < \bar{j} \\ \mathbb{1}[t \geq e_i + j] & \text{if } j = \bar{j} \end{cases} \quad (2)$$

The treatment indicators b_{it}^j are binned at the endpoints, i.e. they also include the effect of the treatment being \underline{j} or more in the future or \bar{j} or more periods ago. In our baseline specification, we analyze time use three years prior to the job loss and up to five years thereafter, thus covering a time frame of eight years. We follow the standard in the literature and fix the coefficient β of the pre-treatment period $t - 1$ to zero (Schmidheiny and Siegloch, 2019).

Equation (1) is estimated using a linear parametric model and standard errors are clustered on the individual level. As the use of a non-linear estimation in the event study framework with individual fixed effects is difficult to implement, we run a robustness check using a non-linear tobit model in a setting without individual fixed effects to check the sensitivity of our results in this respect. We find that our results are robust and thus assume the applicability of a linear model for our empirical analysis.

Although individual fixed effects and the exogenous treatment indicator capture large parts of the unobserved selection, endogeneity concerns may remain with respect to within-individual

¹⁷Due to the fixed effects design, we cannot control for exact paternal and child age directly. Instead, we construct age groups for the father (δ_a) and the youngest child (δ_c), which are still identified as we are able to observe fathers and children multiple times within these age ranges.

¹⁸Bryant *et al.* (2004) show that errors in telephone surveys are larger than those in surveys conducted by mail.

¹⁹While there is some evidence that men do a comparably large share of housework and child care duties would like to preserve a traditional self-image and hence under-report, it is more likely that fathers would like to appear more supportive than they actually are.

selection into remaining unemployed after the job loss which is a precondition to be counted as a treated individual in our data. We account for this by restricting the analysis to potentially less selective fathers who became unemployed up to three months prior to the interview in one robustness check in Table A.7. The results are not sensitive to this change. In order to investigate the potential of remaining within-individual selection into treatment based on time-variant omitted variables, we consider the differences between characteristics in the pre-job loss period $t - 1$ and past periods for treated fathers in more detail in Section 4.4.

A second potential identification problem is the possibility of reverse or simultaneous causality in a situation in which an increased domestic time-investment makes a treatment more likely. This would be the case if 1) an increased pre-treatment time investment is accompanied by a decrease in workplace productivity or engagement which causes the job loss itself, or 2) if a change in time investments immediately after the job loss causes a delayed re-entry into the labor market, which leads to fathers investing more time being more likely to be captured in our treatment in t while fathers investing less time might be re-employed already and thus excluded from our treatment group.

We address the first concern by considering pre-treatment trends in time investment and by analyzing a number of potentially omitted time-variant characteristics and life events such as the partner's labor force status, fertility and regional mobility as well as psychological wellbeing. In addition, we consider these as additional control variables in our model in Section 4.4 and restrict our analysis to plant closures as the most exogenous form of job loss in a robustness check in Section 4.5. We address the second concern by applying a restriction to very recent job losses, as described above, and by analyzing the potential selection into later re-employment based on changes in time investment in the treatment period. The latter results do not indicate any severe selection into re-employment in period $t + 1$ or later depending on the extent of the change in paternal time investment in the household in between $t - 1$ and t . A high or low change in time investment seems not to be a predictor of the re-employment rate of fathers.²⁰

4 Results

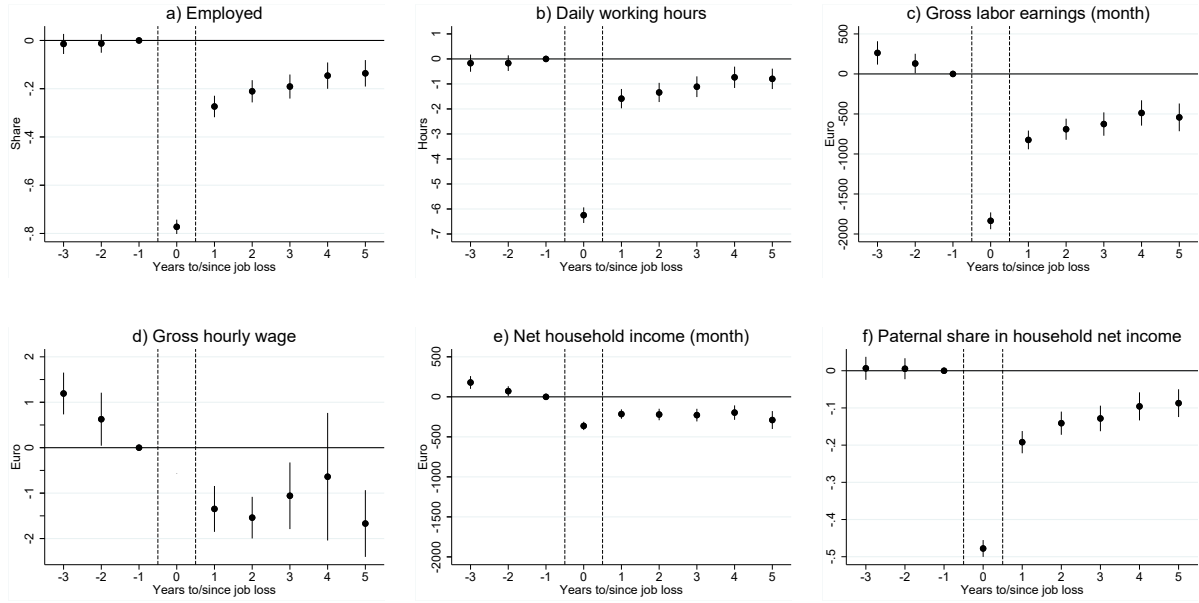
4.1 First Stage - Treatment Characterization

We begin by analyzing how an involuntary job loss impacts employment probabilities, daily working hours, hourly wages, gross labor earnings, net household income, and the paternal income share to understand how our treatment impacts the labor market trajectories of fathers and the financial situation of households.

Figure 2 depicts the coefficients and 95-percent confidence intervals from the interaction of the involuntary job loss indicator with the time difference to the event as stated in equation (1) using

²⁰Results are available from the authors upon request.

Figure 2. First Stage: Hours and Earnings



Notes: The figure plots estimates from an interaction of the job loss with indicators on the time difference to the event. The regressions include individual and year fixed effects and interview and age-group controls. Confidence intervals are based on standard errors clustered on the individual level and refer to the 95 percentile.

Source: Own calculations based on SOEP v35.

the six first stage outcomes as dependent variables. The dashed lines indicate the timing of the job loss, with period $t = 0$ being the start of the unemployment spell initiated by the job loss.

First, we find that the job loss immediately reduces the employment probability by roughly 80 percentage points (pp) (Figure 2a).²¹ Five periods after the job loss, these fathers are still 20 pp. less likely to be employed. Daily working hours fall in the short run by more than six hours (Figure 2b), which corresponds to the additional time available to treated fathers after the job loss. Working hours do not fully recover to pre-treatment levels five years after the job loss.

In addition, we can also see that the involuntary unemployment does not just reduce paternal gross labor earnings in the short and long run (Figure 2c) but also affects net household income (Figure 2e). Social transfers and the adjusted labor force participation of partners thus are, on average, not able to compensate for the earnings losses completely. Interestingly, we can also identify effects on the gross hourly wages of those fathers who are re-employed (Figure 2d). Although less precisely estimated, due to the small sample size, gross hourly wages after re-employment are significantly lower but seem to converge back to pre-shock levels after a short time. In combination with the reduced employment probability, this leads to a long-term

²¹The probability does not fall by 100 pp, as we do not require that fathers have to be employed in the period before the job loss. Fathers may be in a different labor market status in the year prior to the job loss (e.g. in education or unemployed), become employed after the pre-job loss survey date and then experience an involuntary job loss.

reduction of the paternal share in net household income (Figure 2f).

These findings are all largely in line with findings of the earlier literature (see e.g. Halla *et al.*, 2020; Eliason and Storrie, 2006; Arulampalam *et al.*, 2001; Jacobson *et al.*, 1993) and can be taken as first indications for the theoretical applicability of time availability, financial constraints, and changes in bargaining power within the household as potential mechanisms.

In addition to the effects of the job loss on hours and earnings, the graphs in Figure 2 also help us to assess the pre-trends for these variables. While we do not see any pre-treatment trends in working hours, employment probability, and paternal share in the household net income, we can see a negative trend in the pre-treatment hourly wages, which also translates into weak negative trends in gross labor income and net household income. These trends likely depict the anticipation and the deterioration of the economic situation in the firm shortly before the job loss and are in line with the findings of Ashenfelter (1978), commonly known as Ashenfelter’s dip. We argue that these pre-trends nevertheless do not adversely affect our main estimation results due to the fixed effects approach we implement, as long as the pre-trends in domestic hours are not affected by it.

4.2 Main Results

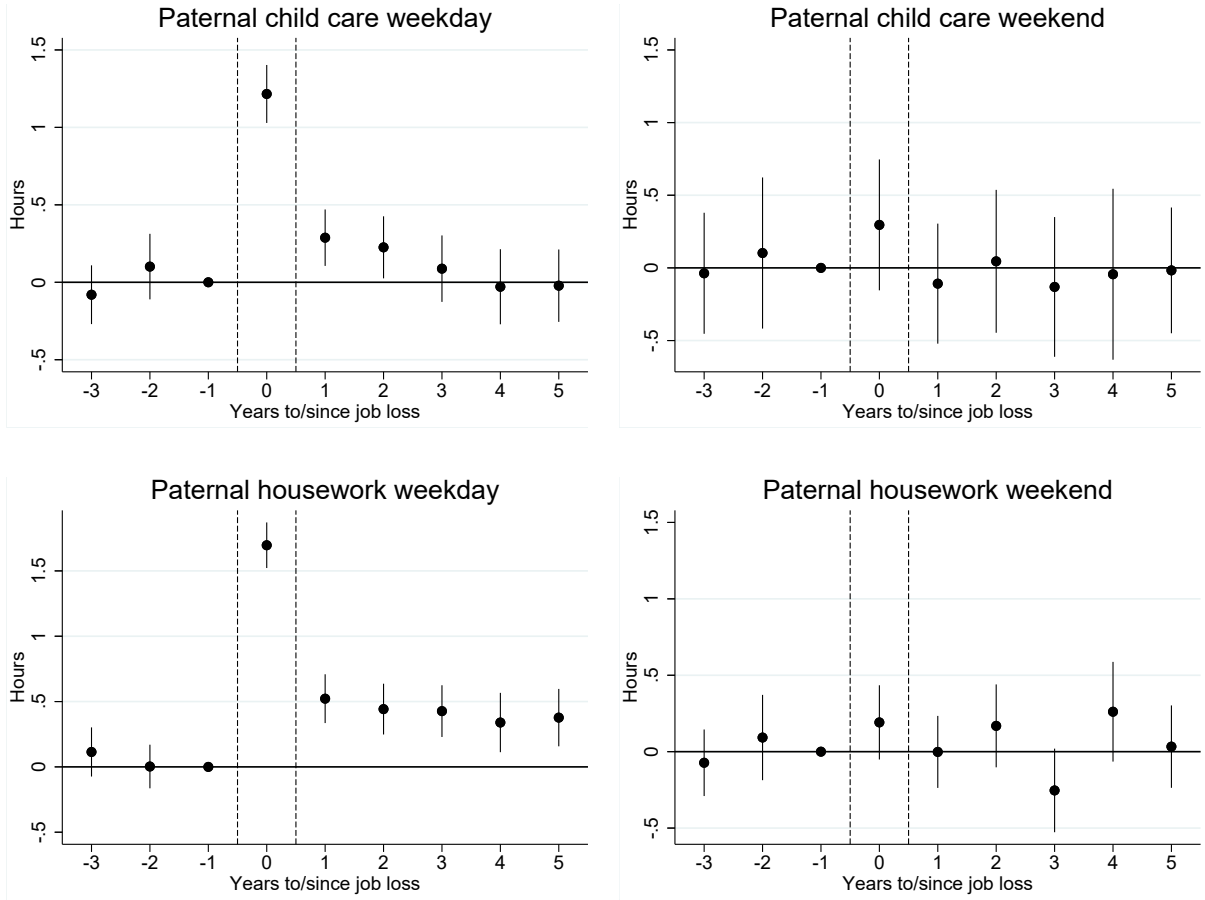
We continue by estimating equation (1) for all four time allocation outcomes: child care on weekdays and weekends as well as housework on weekdays and weekends. Figure 3 depicts the coefficients and 95-percent confidence intervals from the interaction of the involuntary job loss indicator with the time difference to the event. Corresponding regression results including standard errors are provided in Table A.2 in the Appendix.

To begin with, we do not see any pre-treatment trends in time allocation, which is reassuring with respect to potential reverse causality issues and concerns about anticipation. Fathers do not seem to change their time allocation in the periods before the job loss. With respect to the treatment effects, we find that an involuntary job loss significantly increases paternal time allocated to child care by roughly 1.2 hours in the short term, i.e. during the unemployment spell in t , which corresponds to an increase of 58 percent relative to the baseline of 2.06 hours in the pre-treatment period. However, the effect is not persistent in the full sample: as early as in the two subsequent periods this effect falls to between 0.2 to 0.3 hours and vanishes completely three to four years after the job loss.

Nevertheless, this “leveling off” in the effect is likely driven by the re-employment of most of the fathers in the sample and may thus be heterogeneous with respect to the paternal employment status. In contrast to the strong effects during weekdays, no significant effect can be observed during weekends in the short or long run.

Next, we turn to the paternal involvement in housework. Here, the immediate increase in time allocated to housework on a weekday amounts to 1.7 hours, which increases the baseline amount

Figure 3. Baseline results



Notes: The figure plots estimates from an interaction of the job loss with indicators on the time difference to the event. The regressions include individual and year fixed effects and interview and age-group controls. Confidence intervals are based on standard errors clustered on the individual level and refer to the 95 percentile.

Source: Own calculations based on SOEP v35.

of time spent on housework in the pre-treatment period of 2.16 hours by approximately 79 percent. While this effect drops by two thirds to around 0.5 hours in period $t + 1$, it is still significantly positive even five periods after the shock. No significant effect can be observed during weekends. As can be seen in Figure A.3, routine housework, errands as well as repairs and gardening contribute to the overall effect in largely equal shares.

In summary, we find that a job loss leads to a large increase in paternal child care and housework on weekdays during the period of immediate unemployment. The effects seem to be more persistent for housework than for child care. In general, we see that our results for child care are less precisely estimated, which may be the result of substantial heterogeneity in responses to the employment shock. We do not see any substantial effects on weekends. Even though the confidence intervals are larger, which stems from the smaller sample size, the point estimates are not substantial either.

4.3 Heterogeneity Analysis

The main findings do not allow us to draw conclusions about the channels outlined in Section 2 and are at risk of obscuring underlying heterogeneity in the responses. This is why we further investigate the mechanisms behind the raw effects by interacting the event indicators with different group indicators, such as the paternal post-shock employment status, the partner's employment status, paternal education, and the age of the youngest child.

Post-Shock Labor Force Statuses First, we address the obvious question of whether the identified effects are driven by a specific group of fathers (and families) depending on whether they (and their partners) are working or not working in the subsequent periods. This allows us to make statements on whether the observed overall long-term effect constitutes a permanent change in household dynamics, also after re-employment, or is simply driven by the remaining unemployed fathers. Nevertheless, it should be noted that post-shock employment statuses are potentially endogenous due to unobserved intra-individual selection and reverse causality between changes in time investment and re-employment probabilities. The following results, thus, have to be interpreted with care and in light of the discussion on endogeneity in the employment statuses in Section 3.4.

Results of a heterogeneity analysis with respect to paternal and maternal employment status in the post-shock periods are presented in Table 3. We only include fathers with valid information for their partners in this analysis and the sample size is, thus, reduced as it excludes single fathers as well as fathers with missing information on the female partners' labor supply and time use.

In the short run and on weekdays, we find that paternal child care does not differ by taking into account the spousal employment status while the effect on housework involvement is larger for fathers with working partners. We do not find any significant short-run effects on weekends. In the long run, we find positive and persistent weekday effects for fathers who remain unemployed up to four periods after the shock. Compared to the strong effect in the initial unemployment period, the effects also seem to level off if fathers remain unemployed. This is in line with what we find with respect to the distance to the job loss: the short-run effect is stronger for fathers who experienced the job loss more recently.²² The heterogeneities with respect to the partner's employment status nevertheless become more pronounced in the long run and are also clearly visible for child care in the case of fathers remaining unemployed 3 to 4 periods after the job loss. While unemployed fathers with non-working partners seem to slowly converge back to pre-shock periods, unemployed fathers with employed partners continue to invest more. This is even more pronounced if we differentiate using maternal working hours. While unemployed men with part-time employed partners also decrease their time investment

²²Results are available from the authors upon request.

Table 3: Heterogeneity by paternal and maternal employment status

	Estimated treatment effect of job loss			
	Child care		Housework	
	Weekday (1)	Weekend (2)	Weekday (3)	Weekend (4)
<i>Job loss</i>				
Both not working	1.239*** (0.131)	0.062 (0.265)	1.361*** (0.111)	-0.040 (0.143)
Mother working	1.111*** (0.119)	0.405 (0.268)	2.088*** (0.129)	0.303* (0.151)
<i>1-2 periods post</i>				
Both not working	0.791*** (0.166)	0.152 (0.291)	1.025*** (0.141)	-0.158 (0.144)
Father working	-0.510*** (0.115)	-0.892** (0.307)	-0.327** (0.113)	-0.331* (0.163)
Mother working	0.806*** (0.148)	0.413 (0.286)	1.437*** (0.169)	0.116 (0.202)
Both working	-0.231* (0.103)	0.029 (0.259)	-0.048 (0.101)	0.259 (0.149)
<i>3-4 periods post</i>				
Both not working	0.611** (0.201)	-0.315 (0.397)	0.689*** (0.158)	-0.244 (0.198)
Father working	-0.596*** (0.123)	-0.175 (0.333)	-0.149 (0.119)	-0.235 (0.170)
Mother working	0.861*** (0.196)	0.113 (0.356)	1.459*** (0.180)	0.294 (0.211)
Both working	-0.372** (0.130)	0.005 (0.296)	-0.099 (0.118)	-0.129 (0.179)
Obs.	56,550	28,227	56,550	28,227

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

over time, the increased time investment of men with full-time employed partners stays constant 3-4 periods after the shock as well.²³ In contrast, we see a significant decrease in hours spent on child care and housework for fathers who are re-employed, especially if the partner is not working. A similar negative effect can also be seen if the partner is only part-time employed. These effects are, in contrast to all the other observed effects, also observable on weekends.

Although at risk of being biased by selection into post-shock labor force status, this heterogeneity is crucial to understand the underlying mechanisms and counteracting effects behind the overall treatment effect. This heterogeneity reveals that the identified short- and long-term effects on time investment are not caused by the job loss itself but are tied to the labor force

²³Results for the heterogeneity analysis by mother's working hours are available upon request.

status of the respondents.

Child Age and Daycare Use Next, we investigate how the effects differ by child age and daycare use. As we include fathers of children up to the age of 14, the effects for fathers with young children may be concealed since older children require substantially less care. We estimate separate effects for fathers of children up to the age of six and fathers of older children in Table A.3. Furthermore, we differentiate between younger children according to whether they attend daycare and find that the immediate effects on child care are significantly larger for younger children, especially for those who do not attend daycare as the intra-household demand for time investment is much higher.²⁴

Educational Background Finally, we also check how the effects differ by education, splitting fathers according to whether they have obtained a tertiary degree (vocational or academic) in Table A.4. We see that the effects on child care on weekdays are slightly higher for the highly educated fathers. This is largely in line with the existing literature on heterogeneity in paternity-leave take-up with respect to fathers educational level (see e.g. Bünning and Pollmann-Schult, 2016; Tamm, 2019; Twamley and Schober, 2019) and could be driven by more fluid gender norms in the group of highly educated men and a potentially greater understanding of the positive consequences of their investment on their children's outcomes. In contrast to this, we also see a higher short-term effect on housework in fathers without a post-secondary education.

4.4 Co-determined and correlated outcomes

As discussed in Section 3.4, the event study approach with individual fixed effects eliminates much of the potential selection in our treatment variable, however, we may still miss potentially important underlying within-individual changes in correlated and co-determined outcomes and life events. Thus, we further investigate the treatment effects on a number of other interesting outcomes and their pre-treatment trends. We also investigate the sensitivity of our estimated effects to including these potentially endogenous mechanisms in our model.

In Table A.5, we analyze how other outcomes are determined by a paternal involuntary job loss and how the corresponding outcomes evolved prior to the job loss. In doing so, we concentrate on four main aspects of life that might be simultaneously associated with unemployment shocks and time investment in the household: the added worker effect (as measured by the partner's employment and working hours), fertility in the household (as measured by the birth of a biological child), individual wellbeing and mental health, and regional mobility. First, we can not identify any significant pre-treatment trends in fathers' wellbeing, maternal employment and working hours, regional mobility, and household fertility.

²⁴As the literature finds that paternal time investments potentially differ by child gender (Mammen, 2011; Baker and Milligan, 2016), we also split fathers according to whether they have only male or only female children, but do not find any differences. Results are available from the authors upon request.

When looking into the post-job loss periods, we see that while the added worker effect, fertility effects, and wellbeing effects seem to be at play regional mobility seems to remain rather stable after the shock. Maternal employment and individual life satisfaction immediately react to the shock while the fertility reaction occurs with a few years lag.

In the job loss period as well as 1-2 periods thereafter, mothers are 3.9 and 5.3 percentage points more likely to be employed, respectively. This is in line with findings of Halla *et al.* (2020) on an increased labor force participation of wives as a response to husbands' exogenous job losses, with no significant changes being found in the partner's participation at the intensive margin. The probability of an additional (biological) child being born that year is also related to the job loss, and as expected with a lag. Three to four periods after the job loss, there is a significant reduction of 3.6 percentage points. In line with the findings of Lucas *et al.* (2004) and Clark *et al.* (2008), paternal wellbeing significantly drops by around 10 percent.

While an increase in maternal employment demands higher paternal time investments, lower paternal wellbeing and a decreased fertility may decrease time investments. In order to identify whether the estimated effects are driven by changes in these co-determined outcomes, we expand our original model with these and a number of other potentially endogenous control variables. Table A.6 presents results of the main estimation when these endogenous variables are included as controls for the estimates on child care and housework during weekdays.²⁵ On the partner level we control for age, labor force status and a dummy for no partner in the household in column (2). On the child level, we add the daycare status (in daycare, in allday care) of the youngest child and the number of children in the household in column (3). With respect to individual wellbeing and health, we control for self-reported life satisfaction (annually) and mental and physical health (biennially) in column (4).

The estimation results presented in Table A.6 indicate no severe sensitivity of the treatment effects with respect to the inclusion of these variables. In all three cases, the results remain significantly positive and of considerable magnitude. Nevertheless, the consideration of these co-determined variables has two major drawbacks: first, due to observation restrictions, including the variables considerably reduces the size of our estimation sample, and, second, in line with Angrist and Pischke (2008), there is a high risk of the variables imposing a bad controls issue on our model as they are highly endogenous. This is the major reason why the main estimations are based on a specification that excludes them from the model and the results presented in Table A.6 should only be considered ancillary evidence.

²⁵Estimations for time investment during weekends also have been checked in this respect with very similar results. Results are available from authors upon request.

4.5 Robustness Checks

In order to support the validity of our results, we run a number of robustness checks and display the results in Table A.7. We present robustness checks for child care and housework on weekdays only as we find significant effects in our baseline specification only for these variables.²⁶

First, in order to increase the exogeneity of our treatment variable, we use plant closures as the sole cause of the unemployment spell in column (2). Although variation from plant closures is considered more exogenous, this reduces the sample size quite significantly and thus decreases the precision of the estimated effects. Still, we see that the baseline estimates for the job loss period still hold. Fathers significantly increase their time spent on child care and housework while being unemployed also after a plant closure. Nevertheless, the positive effects of the baseline cannot be observed for this sub-sample for the periods afterwards. This is driven by an even higher negative effect for re-employed fathers as well as a very small group of fathers who remain unemployed for more than one year after a plant closure. In period $t + 1$ ($t + 2$), we only observe 101 (82) fathers who lost their job due to a plant closure and are still unemployed, which is why the effect on child care investment cannot be estimated with sufficient precision.

Next, in order to tackle the potential omitted variable bias and reverse causality that could lead to selection into unemployment in period t , we restrict our sample to job losses occurring within three months prior to the interview. The estimated effects in column (3) also hold for this sub-sample of fathers, who should suffer less from selective re-employment until the interview. Thirdly, we replicate our main results using treated fathers only and thus exclude those fathers who never lost their job from the estimation. Although we still use individual fixed effects here and untreated fathers do not directly contribute to the estimated treatment effects, excluding them changes the estimation of age-group and year fixed effects and via this means can still affect the estimated treatment effects. The estimated coefficients in column (4) are robust against this variation.

Then, in column (5), we change the sample restrictions to only include fathers who live with a partner in a household over the whole observation period, thus excluding single fathers as well as potentially separated couples from the analysis. While this induces endogeneity, as an involuntary job loss can impact partnership stability, we potentially avoid a downward bias of our estimates through fathers who reduce their child care engagement after a separation. Nevertheless, we find that the estimated effects hardly change by way of this adjustment.

Next, the estimations in column (6) replicate the results for fathers who lost their job only once during the whole observation period. This reduces the risk of biases in our estimated effect due to job losses being influenced by earlier job losses. Also here, the estimated effects are robust.

²⁶The estimates for time investment on weekends are also robust in all alternative specifications and are available upon request.

Furthermore, in line with the discussion in Section 3.3, we adjust our estimation model for the potential non-linearity induced by the high number of zero hours observed for fathers, especially for child care on weekdays. Column (7) includes the estimated marginal effects based on a tobit model that accounts for the censoring of the time use variable at zero. The tobit model does not allow for the inclusion of individual fixed effects but, reassuringly, the estimated coefficients are robust against this change in the estimation model also when individual fixed effects are dropped.

Lastly, we pay special attention to the weights underlying our two-way fixed effects models. Abraham and Sun (2020) show that two-way fixed effects models – and in particular pre-trends – can be biased in case the treatment timing varies across units and treatment effects are heterogeneous.²⁷ Although the inclusion of never treated fathers in our sample reduces this risk, we follow de Chaisemartin and D’Haultfœuille (2020) and estimate the weights attached to our two-way fixed effects regressions with their stata command `twowayfweights`. We find that only about 14% of the weights are negative. Nevertheless, we still test the robustness of our estimates with respect to these negative weights due to the high importance of underlying effect heterogeneity identified in Section 4.3. We follow de Chaisemartin and D’Haultfœuille (2020) and apply their stata command `did_multipllegt` which is robust to treatment effect heterogeneity. Results are presented in Figure A.4. We find that the short-term effects as well as the pre-trends are not sensitive to using the alternative estimator but most of the observed small long-term effects lose significance due to larger standard errors. Part of this is likely driven by the already identified crucial heterogeneity between different post-treatment labor force statuses which leads to counteracting effects being averaged out in the main estimator.

5 Investigating the Household Dynamics

In order to get a full picture of the household dynamics initiated by the paternal job loss, we devote some attention to the spillover effects on female partners, the relative shares of domestic work undertaken by fathers, and potential changes in the cumulative time investment of both partners as opposed to potential outsourcing of tasks.

5.1 Partner Spillovers and Relative Shares

The proposed channels of changes in gender norms and changes in bargaining power and comparative advantages require the analysis of within-household shifts in domestic responsibilities and division of labor. In addition to understanding how an involuntary job loss changes paternal absolute time investment, it is necessary to also examine the simultaneous changes in maternal time allocation and the share of paternal investments in total household investments. The corresponding estimates are reported in Table 4. Panel A (columns 1 to 4) reports the absolute changes in maternal hours spent on child care and housework on weekdays and weekends,

²⁷See Roth (2020) for a review.

Table 4: Spousal spillovers by paternal and maternal employment status

	A) Maternal hours				B) Paternal share			
	Child care		Housework		Child care		Housework	
	Weekday (1)	Weekend (2)	Weekday (3)	Weekend (4)	Weekday (5)	Weekend (6)	Weekday (7)	Weekend (8)
<i>Job loss</i>								
Both NW	0.854*** (0.236)	0.360 (0.407)	0.431*** (0.109)	0.141 (0.228)	0.058*** (0.010)	0.000 (0.008)	0.084*** (0.009)	0.001 (0.007)
Mother W	-1.352*** (0.204)	-0.809* (0.358)	-0.583*** (0.098)	-0.354 (0.181)	0.122*** (0.012)	0.013 (0.009)	0.177*** (0.011)	0.016* (0.007)
<i>1-2 periods post</i>								
Both NW	0.989*** (0.282)	0.967* (0.404)	0.213 (0.135)	-0.187 (0.203)	0.037** (0.013)	-0.004 (0.008)	0.064*** (0.011)	-0.002 (0.007)
Father W	1.031*** (0.283)	0.608 (0.469)	0.476** (0.153)	0.063 (0.251)	-0.053*** (0.012)	-0.028** (0.009)	-0.046*** (0.011)	-0.010 (0.008)
Mother W	-0.954*** (0.252)	-0.103 (0.442)	-0.816*** (0.129)	-0.054 (0.231)	0.102*** (0.017)	0.018 (0.011)	0.142*** (0.016)	0.003 (0.010)
Both W	-0.478* (0.228)	-0.001 (0.369)	-0.493*** (0.113)	-0.173 (0.164)	-0.013 (0.011)	-0.012 (0.009)	0.013 (0.010)	0.011 (0.007)
<i>3-4 periods post</i>								
Both NW	1.245** (0.458)	-0.759 (0.643)	0.430** (0.163)	-0.011 (0.251)	0.016 (0.018)	-0.007 (0.014)	0.042** (0.016)	-0.015 (0.011)
Father W	1.020** (0.367)	0.500 (0.587)	0.479*** (0.144)	-0.541 (0.280)	-0.060*** (0.014)	-0.018 (0.011)	-0.039** (0.012)	0.005 (0.009)
Mother W	-0.740** (0.287)	-0.279 (0.536)	-0.484*** (0.147)	-0.327 (0.234)	0.088*** (0.020)	-0.005 (0.012)	0.130*** (0.017)	0.016 (0.010)
Both W	-0.658** (0.231)	-0.483 (0.420)	-0.509*** (0.129)	-0.060 (0.225)	-0.005 (0.014)	0.001 (0.011)	0.019 (0.013)	0.002 (0.009)
Obs.	56,550	28,227	56,550	28,227	56,550	28,227	56,550	28,227

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. NW - not working, W - working. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

whereas panel B (columns 5 to 8) reports the changes in the share of time undertaken by the father.

Analogous to the increase in hours for fathers, maternal time investments in child care and housework in the period of job loss significantly decrease during weekdays if mothers are working, and this effect also persists over time. Interestingly, the long-term persistence of the reduced time investment of mothers is also observable in the case of a re-employment of the father as long as both partners are working. Additionally, short-term maternal involvement in child care during weekends decreases. In contrast to this, mothers' time investment in child care and housework increase in the short and long run if she is not working, largely independent of whether her partner is re-employed or not. This indicates shifts in the cumulative time investment in the household, which will be discussed in further detail in the following section.

Based on these observed changes for mothers, we can now interpret the changes in paternal shares more easily. As can be seen in panel B of Table 4, the share of paternal time investment increases as long as the father is unemployed. Nevertheless, this change in the share is much more pronounced if the mother is working. While fathers with working partners increase their share of child care (housework) time by, on average, 12.2% (18%), fathers with non-working partners increase it only by, on average, 5.9% (8.6%). This pattern also remains visible after 3 to 4 periods. The paternal share steadily decreases for fathers with non-working partners, while the share remains relatively stable for fathers with working partners. In contrast to this, the increase in hours for re-employed fathers and the corresponding increase in hours of their non-working partners directly translates into a decreased child care (housework) share of on average 5.0% (4.4%) during weekdays.

A related question is how these spillovers and relative share changes would look in the case of a maternal instead of paternal job loss. Unfortunately, estimating the effects of maternal job loss is constrained by the low number of observed job losses for mothers given the large share of women out of the labor force, 30 percent in our sample. An analysis of the remaining group of women reveals small effects on the time investment of the mothers themselves but no obvious spillovers and no clear pattern with respect to the labor force status of both partners.²⁸

5.2 Household Investment and Outsourcing

Based on the findings presented in the last section, the next step is to consider potential changes in the cumulative time investment of households. This is especially interesting in the cases in which time investments of both parents change in the same direction, i.e. in the case of both parents not working (or both are working). The cumulative household perspective can shed light on the financial constraints channel as it is expected to affect both partners equally. The corresponding estimates are reported in Table 5.

Panel A (columns 1 to 4) reports the absolute changes in cumulative hours spent on child care and housework during weekdays and weekends of both partners, whereas panel B (columns 5 to 7) adds supporting evidence on changes in outsourcing of tasks with respect to the employment of a cleaner or domestic help and the use of external child care.

In line with what we observe for maternal and paternal hours in Tables 3 and 4, cumulative household time investment increases in the case of both partners not working while it decreases in the case of both partners working. In families in which only one partner is working, absolute changes are mainly driven by shifts in the shares between partners. We can only identify a significant increase in cumulative household hours in housework during workdays for unemployed fathers with working partners in the period of the job loss as well as 3 to 4 periods after the job loss as long as he is still unemployed. There are two possible reasons for these changes in

²⁸Results are available from the authors upon request.

Table 5: Cumulative household investment and domestic help

	A) Cumulative				B) Outsourcing		
	Child care		Housework		Domestic help	External care	Child care expenses
	Weekday (1)	Weekend (2)	Weekday (3)	Weekend (4)	(5)	(6)	(7)
<i>Job loss</i>							
Both NW	2.093*** (0.285)	0.843 (1.072)	1.792*** (0.172)	0.202 (0.590)	-0.004 (0.005)	-0.058** (0.021)	-12.673** (4.638)
Mother W	-0.241 (0.247)	-0.809 (0.988)	1.505*** (0.155)	-0.102 (0.480)	-0.008 (0.005)	-0.034 (0.023)	5.988 (5.925)
<i>1-2 periods post</i>							
Both NW	1.780*** (0.349)	2.237* (1.112)	1.238*** (0.210)	-0.690 (0.550)	0.012 (0.010)	-0.036 (0.026)	-18.259*** (5.413)
Father W	0.521 (0.306)	-0.569 (1.197)	0.149 (0.192)	-0.536 (0.626)	-0.010* (0.005)	-0.010 (0.027)	-15.333* (6.501)
Mother W	-0.148 (0.285)	0.619 (1.134)	0.621** (0.198)	0.122 (0.550)	0.011 (0.013)	0.037 (0.034)	4.189 (8.880)
Both W	-0.709** (0.263)	0.056 (1.001)	-0.540*** (0.153)	0.174 (0.435)	-0.002 (0.004)	0.059* (0.027)	15.467* (7.718)
<i>3-4 periods post</i>							
Both NW	1.857*** (0.490)	-2.148 (1.510)	1.119*** (0.228)	-0.511 (0.617)	0.011 (0.012)	-0.001 (0.035)	-8.161 (8.274)
Father W	0.424 (0.393)	0.650 (1.437)	0.330 (0.192)	-1.551* (0.696)	-0.014* (0.006)	-0.045 (0.033)	-0.066 (8.783)
Mother W	0.120 (0.341)	-0.330 (1.359)	0.974*** (0.228)	-0.067 (0.663)	-0.007 (0.010)	0.004 (0.038)	-4.480 (13.983)
Both W	-1.030*** (0.263)	-0.956 (1.124)	-0.608*** (0.182)	-0.377 (0.613)	-0.005 (0.007)	0.023 (0.032)	6.067 (7.684)
Obs.	56,550	28,227	56,550	28,227	47,798	47,798	18,993

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: own calculations based on SOEP v35.

the cumulative household time investment. First, housework and child care are performed more regularly and with more dedication and are less likely to be postponed to weekends, or, second, the outsourcing of tasks is reduced. With respect to housework, the evidence on changes in the employment of domestic help in column (5) point in the direction of the first explanation as we can only see a marginally significant reduction in the probability of employing a domestic help in the case where the mother is working in the period directly after the job loss. Expectations regarding the outsourcing of child care are less clear, especially if we assume that small children necessarily have to be cared for (i.e. someone always has to take care of them). Thus, we think the reduction in outsourcing is the much more likely scenario for child care. Nevertheless, it should be noted that regular daily care in child care facilities is a less flexible form of outsourcing in the case of Germany since pre-school and after-school care is largely covered by public daycare centers and schools at very low, or nearly no, cost. Thus, the coverage of pre-school care is very close to 100 percent for children over the age of three. It is still possible that newly unemployed fathers and their partners take over the care that was provided by other external persons such as grandparents or paid babysitters prior to the job loss. We provide clear evidence for this hypothesis in columns (6) and (7) of Table 4, where we analyze the effect of the changes in the use of external care as well as the monetary expenses for this external care in response to the paternal job loss. We find that if cumulative household investments increase, such as in the case of both partners not working in the period after the job loss, the probability of using external child care significantly decreases along with the corresponding expenses. In contrast to this, external child care use as well as the corresponding costs increase when both partners are employed 1-2 periods after the job loss. Variation in the outsourcing of child care is, thus, an important mechanism in the observed changes in paternal investment.

6 Discussion

What do all these empirical findings imply for the potential channels discussed in Section 2? The increase in paternal time allocated to child care and housework on an average weekday is concentrated on unemployed fathers and accompanied by a proportional decrease in maternal time investment. This supports the time availability channel, as the additional time available after the job loss is partly directed into domestic work. The channel is amplified by financial constraints, which force the father to replace expensive external providers of child care and housework or compensate for his partner's reduced availability for domestic work.

Financial constraints matter in particular if both partners are not working, which is visible in the increased maternal time investments and reduced outsourcing of tasks. Additionally, our heterogeneity analysis for children's age and child care status showed that a higher intra-household demand for time investment, for example if very young children are present or the children are not in daycare, also amplifies the effect of time availability.

The negative effects on time investment for re-employed fathers suggest no persistent change

in gender norms or emotional bonding. Instead, they underline the relevance of workplace demands, which not only offset but even reverse the short-term changes in the household division of domestic labor. The absence of changes in gender norms and emotional bonding is also reflected in diminishing positive effects for unemployed fathers over time.

Although the observed short-term changes in time investment during weekdays could also be explained by changes in intra-household bargaining powers and comparative advantages, these mechanisms would also be likely to cause changes in paternal time investments on weekends, which is not the case in our data. The paternal share in the households' total time investment on weekends does not change significantly, which makes it less likely that a change in bargaining powers is responsible for changes in intra-household time allocation in most households.

Apart from financial constraints, some of the increase in paternal (and maternal) time investment in child care and housework could also be driven by intrinsic, preference-driven motivation derived from, for example, enjoyment from spending more time with the children or living in a clean house. The increase in time investment in child care is a particularly important finding as it might indicate an increase in parental engagement (as opposed to external care). In addition, we find indications that awareness of the importance of time investments for children's outcomes matter: while higher paternal education is linked to a higher effect on child care investment, the reverse is true for housework.

The identified quantitative changes in paternal (and maternal) time allocation are silent on the underlying quality of the (increased) time investment. An involuntary job loss constitutes a drastic change in the paternal labor force status. The existing literature indicates a parental job loss has a strong impact on individual wellbeing (Lucas *et al.*, 2004; Clark *et al.*, 2008), on mental and physical health (Browning and Heinesen, 2012; Sullivan and Von Wachter, 2009; Classen and Dunn, 2012), on spousal wellbeing and mental health (Nikolova and Ayhan, 2019; Marcus, 2013), and on marital stability (Eliason, 2012). It thus has important implications for children's outcomes (Ström, 2002; Coelli, 2011; Stevens and Schaller, 2011; Bratberg *et al.*, 2008; Oreopoulos *et al.*, 2008; Schaller and Zerpa, 2019; Lindo, 2011; Mörk *et al.*, 2014; Peter, 2016). Another commonly discussed topic in this respect is domestic violence and how it is potentially triggered by negative emotional cues such as unemployment (Card and Dahl, 2011; Anderberg *et al.*, 2016). Additionally, as the work of Kalenkoski and Foster (2008) shows, a quantitative increase in reported child care engagement does not necessarily correspond to an increase in high quality, active child care. While the adverse effects described above have the potential of negatively affecting child care quality, the findings of Knabe *et al.* (2010) also suggest an increase in child care quality is possible, for example if the conflict between family and work life is eased and the negative affect during child care activities is thus reduced.

7 Conclusion

Despite increases in maternal labor supply in virtually all developed countries, gender differences in care work, the so-called “gender care gap”, persist. Parental leave regulations that include father quotas in leave-taking have so far been shown to reduce this gap only in the short run and also suffer from selection imposed by the voluntary nature of the treatment. As governmental efforts to increase paternal involvement, therefore, seem to be blocked by stronger unobserved forces, such as gender norms or workplace practices, we ask whether an involuntary temporary elimination of these forces is able to shift the intra-household allocation of domestic work in the long run. We do so by providing evidence on how a negative paternal employment shock, in the form of an involuntary job loss, shapes domestic time allocation within households in the short and long run.

Our findings show that a paternal job loss increases the time allocated to child care and housework by, on average, 1.2 hours and 1.7 hours, respectively, on regular weekdays in the short run. This corresponds to a 58 percent increase for child care and a 79 percent increase for housework relative to the baseline. Heterogeneity analyses confirm that the persistence of these effects is mainly driven by fathers who do not return to the labor market immediately and who have a spouse who is active on the labor market. Additionally, we find no evidence for changes in the time allocation on weekends during unemployment. In contrast to this, we find a strong and persistent negative effect on time investment on weekdays and weekends for fathers who are re-employed after the initial unemployment period, especially if they have non-working partners.

All the results are robust to changes in the estimation sample, the definition of our treatment variable, the estimation method, and the specification. Furthermore, our event study approach shows no pre-trends. We also find that employed mothers, on average, respond to the change in paternal time allocation by persistently decreasing domestic time investments, while non-working mothers actually increase the time allocated to child care and housework, thus increasing the cumulative household investment and decreasing the outsourcing of domestic tasks.

We interpret our findings as evidence for the time availability channel and the relevance of financial constraints. Based on heterogeneity analyses, differential effects on weekdays and weekends, and the persistence of these effects, we conclude that changes in intra-household bargaining power, gender norms and emotional bonding are less likely to be drivers of observed effects. The exogenous shock we analyze is likely to be accompanied by important parallel negative consequences for families, which limits the potential for generalization and application on the part of policy makers aiming to free up fathers’ time for domestic duties. Although the average father increases his engagement, which may be beneficial to his children, the situation may actually get worse for many children due to the nature of the shock we are looking at. Future research could therefore attempt to disentangle the potential positive effects of quantitatively in-

creased paternal involvement through employment shocks on children's future outcomes from the known negative effects of unemployment on the quality of child care and analyze in detail the quality of reported paternal activities, such as in time use surveys, in detail.

In conclusion, we find that paternal availability can induce changes in the families through a more equal division of tasks and a reduction in outsourcing, but we also see forces reversing these constellations in the case of a re-employment. We cannot identify any clear long-term changes in comparative advantages, gender role attitudes, and emotional bonds. This provides important policy implications as it indicates that overcoming existing external barriers to increased paternal involvement, such as societal gender norms, workplace practices and expectations, may be preferable to short-term impulses, such as parental leave quotas, which are likely to have few long-term consequences even if their take-up were to increase.

References

- ABRAHAM, S. and SUN, L. (2020). Estimating Dynamic Treatment Effects in Event Studies With Heterogeneous Treatment Effects. *Journal of Econometrics*, **forthcoming** (available as arXiv:1804.05785v2).
- ALLEN, S. M. and HAWKINS, A. J. (1999). Maternal Gatekeeping: Mothers' Beliefs and Behaviors That Inhibit Greater Father Involvement in Family Work. *Journal of Marriage and the Family*, **61** (1), 199–212.
- ALON, T., DOEPKE, M., OLMSTEAD-RUMSEY, J. and TERTILT, M. (2020). *The Impact of COVID-19 on Gender Equality*. Tech. rep., National Bureau of Economic Research, Cambridge, MA.
- ÁLVAREZ, B. and MILES, D. (2003). Gender effect on housework allocation: Evidence from Spanish two-earner couples. *Journal of Population Economics*, **16** (2), 227–242.
- ANDERBERG, D., RAINER, H., WADSWORTH, J. and WILSON, T. (2016). Unemployment and Domestic Violence: Theory and Evidence. *The Economic Journal*, **126** (597), 1947–1979.
- ANGRIST, J. D. and PISCHKE, J. S. (2008). *Mostly harmless econometrics: an empiricist's companion*. Princeton University Press.
- ARRIGHI, B. A. and MAUME, D. J. (2000). Workplace subordination and men's avoidance of housework. *Journal of Family Issues*, **21** (4), 464–487.
- ARULAMPALAM, W., GREGG, P. and GREGORY, M. (2001). Unemployment Scarring. *The Economic Journal*, **111** (475), F577–F584.
- ASHENFELTER, O. (1978). Estimating the Effect of Training Programs on Earnings. *The Review of Economics and Statistics*, **60** (1), 47.
- AVERETT, S. L., GENNETIAN, L. A. and PETERS, H. E. (2000). Patterns and determinants of paternal child care during a child's first three years of life. *Marriage and Family Review*, **29** (2-3), 115–136.
- , — and — (2005). Paternal child care and children's development. *Journal of Population Economics*, **18** (3), 391–414.
- BAKER, M. and MILLIGAN, K. (2016). Boy-girl differences in parental time investments: Evidence from three countries. *Journal of Human Capital*, **10** (4), 399–441.
- BARTEL, A. P., ROSSIN-SLATER, M., RUHM, C. J., STEARNS, J. and WALDFOGEL, J. (2018). Paid Family Leave, Fathers' Leave-Taking, and Leave-Sharing in Dual-Earner Households. *Journal of Policy Analysis and Management*, **37** (1), 10–37.
- BECKER, G. S. (1974). A Theory of Social Interactions. *Journal of Political Economy*, **82** (6), 1063–1093.
- (1981). *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- BIANCHI, S. M. (2000). Maternal employment and time with children: Dramatic change or surprising continuity? *Demography*, **37** (4), 401–414.
- BIRKETT, H. and FORBES, S. (2019). Where's dad? Exploring the low take-up of inclusive parenting policies in the UK. *Policy Studies*, **40** (2), 205–224.
- BRADY, M., STEVENS, E., COLES, L., ZADOROZNYJ, M. and MARTIN, B. (2017). 'You can Spend Time...But not Necessarily be Bonding with Them': Australian Fathers' Constructions and Enactments of Infant Bonding. *Journal of Social Policy*, **46** (1), 69–90.
- BRANDTH, B. and KVANDE, E. (2019). Workplace support of fathers parental leave use in Norway. *Community, Work & Family*, **22** (1), 43–57.
- BRATBERG, E., NILSEN, O. A. and VAAGE, K. (2008). Job losses and child outcomes. *Labour Economics*, **15** (4), 591–603.
- BROWNING, M. and HEINESSEN, E. (2012). Effect of job loss due to plant closure on mortality and hospitalization. *Journal of Health Economics*, **31** (4), 599–616.

- BRYANT, W. K., KANG, H., ZICK, C. D. and CHAN, A. Y. (2004). Measuring housework in time use surveys. *Review of Economics of the Household*, **2** (1), 23–47.
- BÜNNING, M. (2015). What happens after the daddy months? Fathers involvement in paid work, child-care, and housework after taking parental leave in Germany. *European Sociological Review*, **31** (6), 738–748.
- BÜNNING, M. (2020). Paternal Part-Time Employment and Fathers' Long-Term Involvement in Child Care and Housework. *Journal of Marriage and Family*, **82** (2), 566–586.
- BÜNNING, M. and POLLMANN-SCHULT, M. (2016). Family policies and fathers' working hours: cross-national differences in the paternal labour supply. *Work, Employment and Society*, **30** (2), 256–274.
- BURDA, M., HAMERMESH, D. S. and WEIL, P. (2013). Total work and gender: Facts and possible explanations. *Journal of Population Economics*, **26** (1), 239–261.
- BYGREN, M. and DUVANDER, A. Z. (2006). Parents' workplace situation and fathers' parental leave use. *Journal of Marriage and Family*, **68** (2), 363–372.
- CARD, D. and DAHL, G. B. (2011). Family violence and football: The effect of unexpected emotional cues on violent behavior. *Quarterly Journal of Economics*, **126** (1), 103–143.
- CHADI, A. and HETSCHKO, C. (2020). How Job Changes Affect People's Lives — Evidence from Subjective Well-Being Data. *British Journal of Industrial Relations*, p. bjir.12536.
- CLARK, A. E., DIENER, E., GEORGELLIS, Y. and LUCAS, R. E. (2008). Lags and leads in life satisfaction: a test of the baseline hypothesis. *The Economic Journal*, **118** (529), 222–243.
- CLASSEN, T. J. and DUNN, R. A. (2012). The effect of job loss and unemployment duration on suicide risk in the United States: A new look using mass-layoffs and unemployment duration. *Health Economics*, **21** (3), 338–350.
- COELLI, M. B. (2011). Parental job loss and the education enrollment of youth. *Labour Economics*, **18** (1), 25–35.
- COLTRANE, S. (2000). Research on household labor: Modeling and measuring the social embeddedness of routine family work. *Journal of Marriage and Family*, **62** (4), 1208–1233.
- COUPRIE, H. (2007). Time allocation within the family: Welfare implications of life in a couple. *The Economic Journal*, **117** (516), 287–305.
- CUNNINGHAM, M. (2007). Influences of women's employment on the gendered division of household labor over the life course: Evidence from a 31-year panel study. *Journal of Family Issues*, **28** (3), 422–444.
- DAVIS, S. N., GREENSTEIN, T. N. and GERTEISEN MARKS, J. P. (2007). Effects of union type on division of household labor: Do cohabiting men really perform more housework? *Journal of Family Issues*, **28** (9), 1246–1272.
- DE CHAISEMARTIN, C. and D'HAULTFŒUILLE, X. (2020). Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects. *American Economic Review*, **110** (9), 2964–2996.
- DOUCET, A. (2006). Estrogen-filled worlds': Fathers as primary caregivers and embodiment. *Sociological Review*, **54** (4), 696–716.
- (2009). Dad and baby in the first year: Gendered responsibilities and embodiment. *Annals of the American Academy of Political and Social Science*, **624** (1), 78–98.
- EKBERG, J., ERIKSSON, R. and FRIEBEL, G. (2013). Parental leave - A policy evaluation of the Swedish "Daddy-Month" reform. *Journal of Public Economics*, **97** (1), 131–143.
- ELIASON, M. (2012). Lost jobs, broken marriages. *Journal of Population Economics*, **25** (4), 1365–1397.
- and STORRIE, D. (2006). Lasting or latent scars? Swedish evidence on the long-term effects of job displacement. *Journal of Labor Economics*, **24** (4), 831–856.

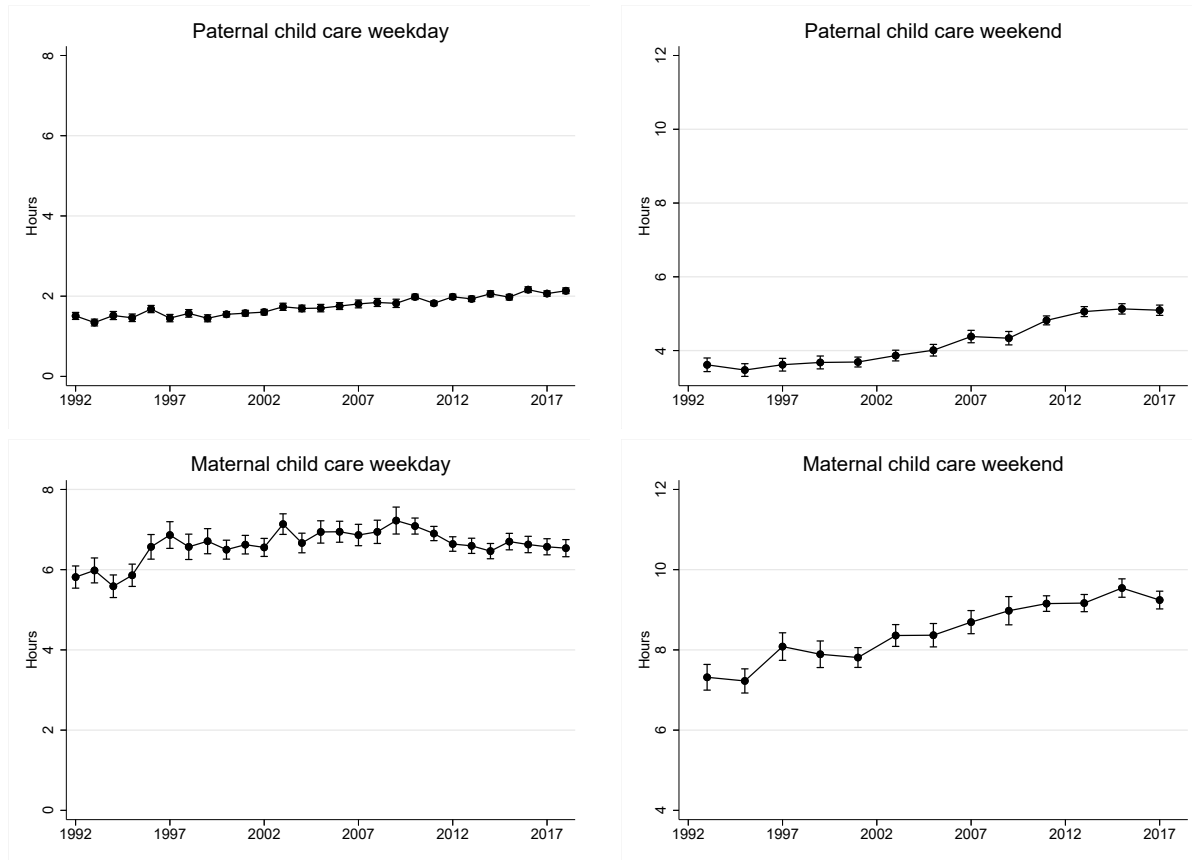
- ELKINS, R. and SCHURER, S. (2020). Exploring the role of parental engagement in non-cognitive skill development over the lifecycle. *Journal of Population Economics*, **33** (3), 957–1004.
- FAUSER, S. (2019). Time availability and housework: The effect of unemployment on couples' hours of household labor. *Social Science Research*, **83**.
- FOSTER, G. and STRATTON, L. S. (2018). Do significant labor market events change who does the chores? Paid work, housework, and power in mixed-gender Australian households. *Journal of Population Economics*, **31** (2), 483–519.
- GEISLER, E. and KREYENFELD, M. (2011). Against all odds: Fathers use of parental leave in Germany. *Journal of European Social Policy*, **21** (1), 88–99.
- GOEBEL, J., GRABKA, M. M., LIEBIG, S., KROH, M., RICHTER, D., SCHRÖDER, C. and SCHUPP, J. (2019). The German Socio-Economic Panel (SOEP). *Jahrbücher für Nationalökonomie und Statistik*, **239** (2), 345–360.
- HAAS, L. and HWANG, C. P. (2008). The impact of taking parental leave on fathers' Participation in childcare and relationships with children: Lessons from Sweden. *Community, Work and Family*, **11** (1), 85–104.
- HALLA, M., SCHMIEDER, J. and WEBER, A. (2020). Job Displacement, Family Dynamics, and Household Labor Supply. *American Economic Journal: Applied Economics*, **forthcoming**.
- HOOKE, J. L. (2010). Gender inequality in the welfare state: Sex segregation in housework, 1965-2003. *American Journal of Sociology*, **115** (5), 1480–1523.
- HUPKAU, C. and PETRONGOLO, B. (2020). Work, care and gender during the Covid-19 crisis. *CEP COVID-19 ANALYSIS*, **002**.
- JACOBSON, L. S., LALONDE, R. J. and SULLIVAN, D. G. (1993). Earnings losses of displaced workers. *The American Economic Review*, **83** (4), 685–709.
- KAHNEMAN, D., KRUEGER, A. B., SCHKADE, D. A., SCHWARZ, N. and STONE, A. A. (2004). A survey method for characterizing daily life experience: The day reconstruction method. *Science*, **306** (5702), 1776–1780.
- KALENKOSKI, C. M. and FOSTER, G. (2008). The quality of time spent with children in Australian households. *Review of Economics of the Household*, **6** (3), 243–266.
- KIMMEL, J. and CONNELLY, R. (2007). *Mothers' time choices: Caregiving, leisure, home production, and paid work*. Tech. Rep. 3.
- KNABE, A., RÄTZEL, S., SCHÖB, R., WEIMANN, J. and GORMAN, W. M. (2010). Dissatisfied with life but having a good day: Time-use and well-being of the unemployed. *The Economic Journal*, **120** (547), 867–889.
- KNUDSEN, K. and WÆRNESS, K. (2008). National context and spouses' Housework in 34 countries. *European Sociological Review*, **24** (1), 97–113.
- KREYENFELD, M., ZINN, S., ENTRINGER, T., GOEBEL, J., GRABKA, M. M., GRAEBER, D., KROH, M., KRÖGER, H., KÜHNE, S., LIEBIG, S., SCHRÖDER, C., SCHUPP, J. and SEEBAUER, J. (2020). Coronavirus & Care: How the Coronavirus Crisis Affected Fathers' Involvement in Germany. *SOEP-papers*, **1096**.
- LACHANCE-GRZELA, M. and BOUCHARD, G. (2010). Why Do Women Do the Lion's Share of Housework? A Decade of Research. *Sex Roles*, **63** (11), 767–780.
- LINDO, J. M. (2011). Parental job loss and infant health. *Journal of Health Economics*, **30** (5), 869–879.
- LIPPMANN, Q., GEORGIEFF, A. and SENIK, C. (2020). Undoing Gender with Institutions: Lessons from the German Division and Reunification. *The Economic Journal*, **130** (629), 1445–1470.
- LUCAS, R. E., CLARK, A. E., GEORGELLIS, Y. and DIENER, E. (2004). Unemployment alters the set point for life satisfaction. *Psychological Science*, **15** (1), 8–13.

- LUNDBERG, S. and POLLAK, R. A. (1996). Bargaining and Distribution in Marriage. *Journal of Economic Perspectives*, **10** (4), 139–158.
- MAMMEN, K. (2011). Fathers' time investments in children: do sons get more? *Journal of Population Economics*, **24** (3), 839–871.
- MANGIAVACCHI, L., PICCOLI, L. and PIERONI, L. (2020). Fathers Matter: Intra-Household Responsibilities and Children's Wellbeing during the COVID-19 Lockdown in Italy. *IZA Discussion Paper*, **13519**.
- MARCUS, J. (2013). The effect of unemployment on the mental health of spouses - Evidence from plant closures in Germany. *Journal of Health Economics*, **32** (3), 546–558.
- MÖRK, E., SJÖGREN, A. and STUDIES, H. S. (2014). Parental unemployment and child health. *CESifo Economic Studies*, **60** (2), 366–401.
- NAZ, G. (2010). Usage of parental leave by fathers in Norway. *International Journal of Sociology and Social Policy*, **30** (5-6), 313–325.
- NEPOMNYASCHY, L. and WALDFOGEL, J. (2007). Paternity leave and fathers' involvement with their young children. *Community, Work and Family*, **10** (4), 427–453.
- NIKOLOVA, M. and AYHAN, S. H. (2019). Your spouse is fired! How much do you care? *Journal of Population Economics*, **32** (3), 799–844.
- OECD (2020). OECD employment database, Employment: Time spent in paid and unpaid work, by sex. <https://stats.oecd.org/index.aspx?queryid=54757>, accessed: 2020-07-30.
- OREOPOULOS, P., PAGE, M. and STEVENS, A. H. (2008). The intergenerational effects of worker displacement. *Journal of Labor Economics*, **26** (3), 455–483.
- PAILHÉ, A., SOLAZ, A. and TÔ, M. (2018). Can Daddies Learn How to Change Nappies? Evidence from a Short Paternity Leave Policy. *Documents de Travail*, **240**.
- PATNAIK, A. (2019). Reserving time for daddy: The consequences of fathers quotas. *Journal of Labor Economics*, **37** (4), 1009–1059.
- PETER, F. (2016). The effect of involuntary maternal job loss on childrens behaviour and non-cognitive skills. *Labour Economics*, **42**, 43–63.
- PETRONGOLO, B. and RONCHI, M. (2020). Gender gaps and the structure of local labor markets. *Labour Economics*, **64**.
- RALEY, S., BIANCHI, S. M. and WANG, W. (2012). When do fathers care? Mothers' economic contribution and fathers' involvement in child care. *American Journal of Sociology*, **117** (5), 1422–1459.
- ROTH, J. (2020). Pre-test with Caution: Event-study Estimates After Testing for Parallel Trends.
- SAMTLEBEN, C. (2019). Also on Sundays, Women Perform Most of the Housework and Child Care. *DIW Weekly Report*, **86** (10), 139–144.
- , BRINGMANN, J., BÜNNING, M. and HIPPE, L. (2019). What Helps and What Hinders? Exploring the Role of Workplace Characteristics for Parental Leave Use and Its Career Consequences. *Social Sciences*, **8** (10), 270.
- SAMUELSON, P. A. (1956). Social Indifference Curves. *The Quarterly Journal of Economics*, **70** (1), 1–22.
- SANCHEZ, L. and THOMSON, E. (1997). Becoming mothers and fathers: Parenthood, gender, and the division of labor. *Gender and Society*, **11** (6), 747–772.
- SCHALLER, J. and ZERPA, M. (2019). Short-run effects of parental job loss on child health. *American Journal of Health Economics*, **5** (1), 8–41.
- SCHMIDHEINY, K. and SIEGLOCH, S. (2019). On Event Study Designs and Distributed-Lag Models: Equivalence, Generalization and Practical Implications. *CESifo Working Paper*, No. **7481**.

- SCHOBER, P. S. (2014). Parental leave and domestic work of mothers and fathers: A longitudinal study of two reforms in west germany. *Journal of Social Policy*, **43** (2), 351–372.
- and ZOCH, G. (2019). Change in the gender division of domestic work after mothers or fathers took leave: exploring alternative explanations. *European Societies*, **21** (1), 158–180.
- SOEP (2019). Socio Economic Panel Data: Data for years 1984–2018, version 35, Doi: 10.5684/soep-core.v35.
- STEVENS, A. H. and SCHALLER, J. (2011). Short-run effects of parental job loss on children’s academic achievement. *Economics of Education Review*, **30**, 289–299.
- STRATTON, L. S. (2012). The role of preferences and opportunity costs in determining the time allocated to housework. *American Economic Review: Papers & Proceedings*, **102** (3), 606–611.
- STRÖM, S. (2002). Keep out of the reach of children: Parental unemployment and children’s accident risks in Sweden 1991–1993. *International Journal of Social Welfare*, **11** (1), 40–52.
- SULLIVAN, D. and VON WACHTER, T. (2009). Job displacement and mortality: An analysis using administrative data. *Quarterly Journal of Economics*, **124** (3), 1265–1306.
- SULLIVAN, O. (2013). What Do We Learn About Gender by Analyzing Housework Separately From Child Care? Some Considerations From Time-Use Evidence. *Journal of Family Theory & Review*, **5** (2), 72–84.
- TAMM, M. (2019). Fathers parental leave-taking, childcare involvement and labor market participation. *Labour Economics*.
- TANAKA, S. and WALDFOGEL, J. (2007). Effects of parental leave and work hours on fathers’ involvement with their babies. *Community, Work and Family*, **10** (4), 409–426.
- TWAMLEY, K. and SCHOBER, P. (2019). Shared parental leave: Exploring variations in attitudes, eligibility, knowledge and take-up intentions of expectant mothers in London. *Journal of Social Policy*, **48** (2), 387–407.
- VIERLING-CLAASSEN, A. (2013). Division of labor in child care: A game-theoretic approach. *Rationality and Society*, **25** (2), 198–228.
- VOSSEMER, J. and HEYNE, S. (2019). Unemployment and Housework in Couples: Task-Specific Differences and Dynamics Over Time. *Journal of Marriage and Family*, **81** (5), 1074–1090.

Appendix

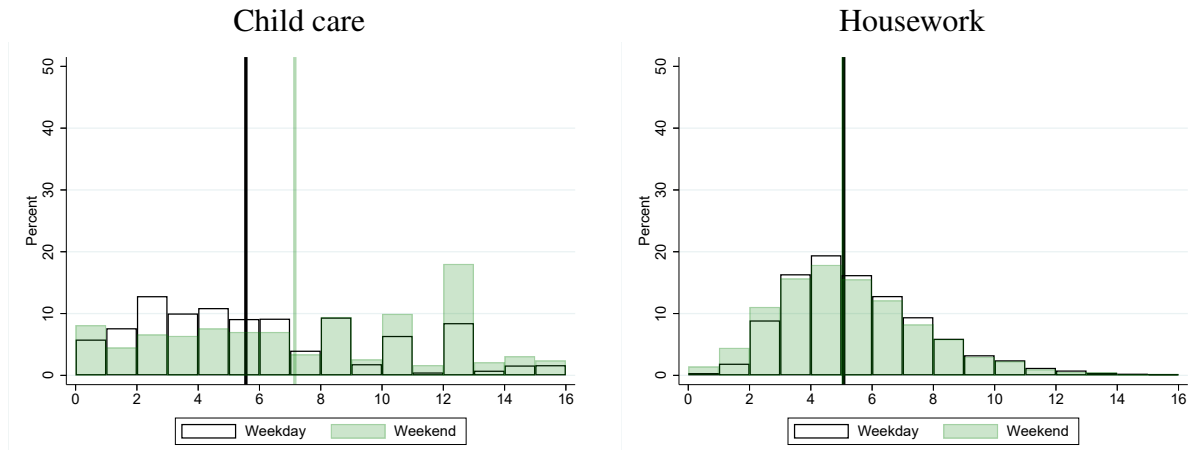
Figure A.1. Time spent on child care over time



Notes: The figure plots the average time spent on child care by fathers and mothers excluding single parents households, from 1992 to 2017.

Source: Own calculations based on SOEP v35, weighted.

Figure A.2. Maternal time spent on child care and housework



Notes: The figure plots the distribution of the maternal time use variables. The vertical lines indicate the sample mean.

Source: Own calculations based on SOEP v35, weighted.

Table A.1: Descriptive statistics

	Sample				Difference
	Inv. job loss		No inv. job loss		
	Sample mean	N	Sample mean	N	
<i>Paternal characteristics (time invariant)</i>					
Age	38.78	7,117	40.63	52,321	1.85***
Migration background (D)	0.34	7,117	0.25	52,321	-0.09***
No degree (D)	0.21	7,117	0.10	52,321	-0.11***
Vocational degree (D)	0.71	7,117	0.71	52,321	-0.01
Academic degree (D)	0.10	7,117	0.28	52,321	0.18***
<i>Child characteristics</i>					
Total number of children up to age 18	1.96	7,117	1.88	52,321	-0.08***
Age youngest child	6.26	7,117	6.40	52,321	0.13*
<i>Partner characteristics (for those with a partner)</i>					
Age	35.79	6,801	37.67	49,919	1.88***
In labor force (D)	0.68	6,801	0.70	49,919	0.02**
Working (D)	0.48	6,801	0.53	49,919	0.05***
<i>Income and health</i>					
Net household income (month)	2621.61	6,937	3575.16	50,314	953.56***
Mental health	50.34	4,078	51.25	30,281	0.91***
Physical health	51.01	4,078	53.06	30,281	2.05***
<i>Outcomes</i>					
Child care weekday	2.22	7,117	1.75	52,321	-0.46***
Child care weekend	4.32	3,535	4.47	26,247	0.15*
Housework weekday	2.65	7,117	2.14	52,321	-0.50***
Housework weekend	2.86	3,535	2.93	26,247	0.07*

Notes: The table provides descriptive statistics for fathers experiencing an involuntary job loss and fathers who do not. Column (6) reports the difference between the two groups. Dummy variables are marked with a D. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

Table A.2: Main results

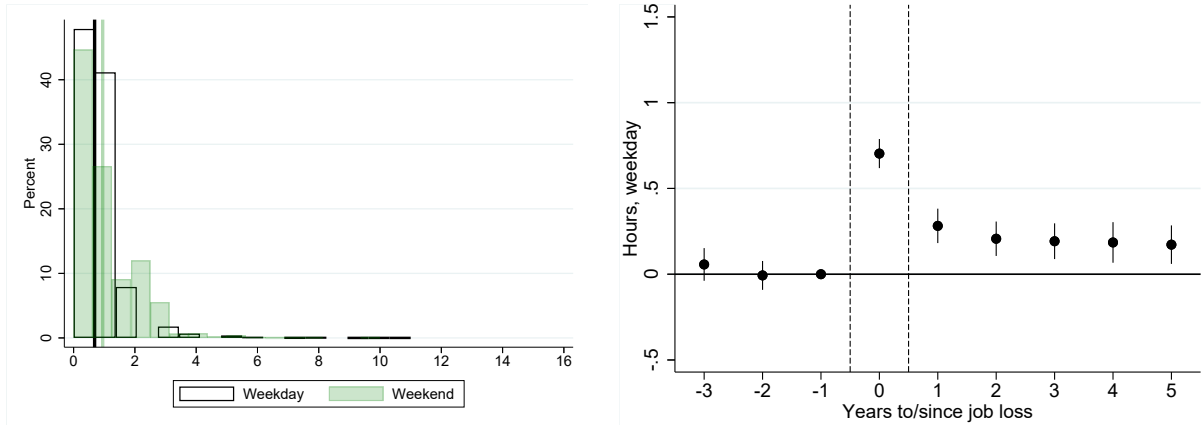
	Estimated treatment effect of job loss			
	Child care		Housework	
	Weekday (1)	Weekend (2)	Weekday (3)	Weekend (4)
3 periods pre	-0.072 (0.096)	-0.075 (0.210)	0.133 (0.095)	-0.082 (0.110)
2 periods pre	0.096 (0.107)	0.096 (0.258)	0.010 (0.084)	0.063 (0.139)
Job loss	1.223*** (0.095)	0.277 (0.225)	1.710*** (0.089)	0.152 (0.123)
1 period post	0.259** (0.092)	-0.153 (0.207)	0.542*** (0.095)	-0.009 (0.119)
2 periods post	0.192 (0.101)	-0.029 (0.246)	0.463*** (0.099)	0.129 (0.136)
3 periods post	0.087 (0.108)	-0.174 (0.242)	0.443*** (0.100)	-0.267 (0.138)
4 periods post	-0.064 (0.122)	-0.154 (0.299)	0.343** (0.114)	0.282 (0.168)
5 periods post	-0.045 (0.118)	-0.076 (0.219)	0.376*** (0.111)	0.009 (0.136)
Pre-treatment mean	2.00	4.50	2.14	2.72
Obs.	59,438	29,782	59,438	29,782

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

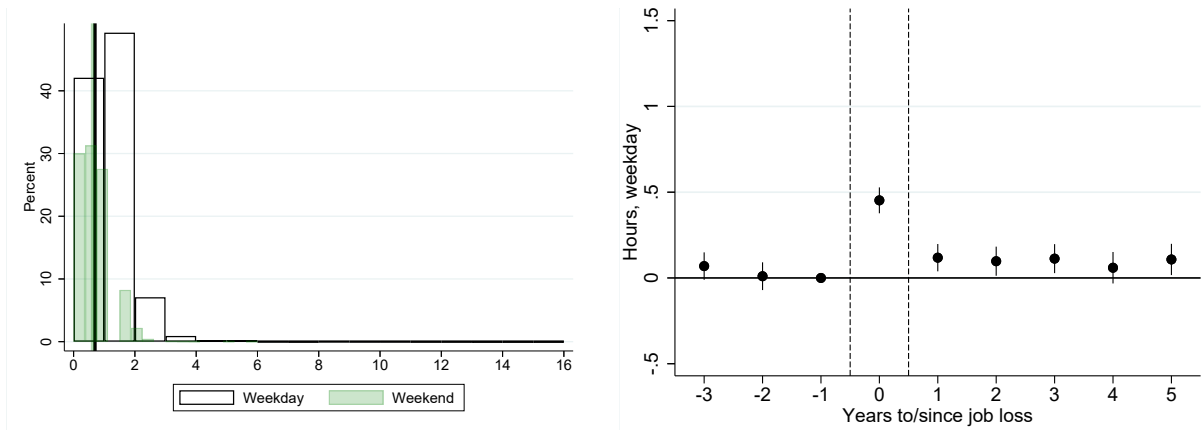
Source: Own calculations based on SOEP v35.

Figure A.3. Housework composition

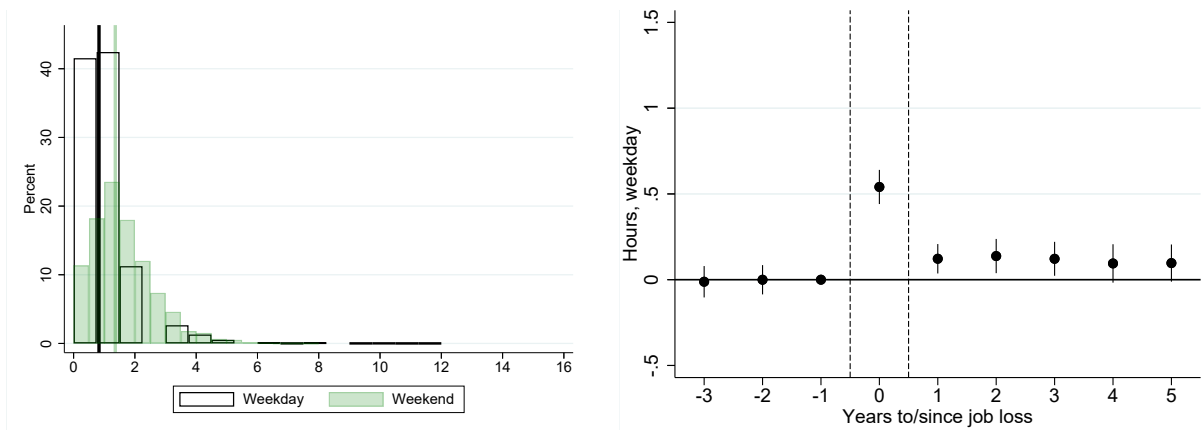
1) Routine Housework (washing, cooking, cleaning)



2) Errands



3) Repairs and gardening



Notes: The left figures plot the distribution of the respective outcome variable. The right figures plot estimates from an interaction of the job loss with indicators on the time difference to the event. The regressions include individual and year fixed effects and interview and age-group controls. Confidence intervals are based on standard errors clustered on the individual level and refer to the 95 percentile.

Source: Own calculations based on SOEP v35.

Table A.3: Heterogeneity by child age and daycare use

	Estimated treatment effect of job loss			
	Child care		Housework	
	Weekday (1)	Weekend (2)	Weekday (3)	Weekend (4)
<i>Job loss</i>				
Children > 6	0.876*** (0.114)	0.397 (0.287)	1.935*** (0.128)	0.300 (0.157)
Child ≤ 6 not in daycare	1.854*** (0.181)	-0.141 (0.308)	1.517*** (0.138)	-0.257 (0.168)
Child ≤ 6 in daycare	1.062*** (0.152)	0.461 (0.325)	1.576*** (0.147)	0.127 (0.172)
<i>1-2 periods post</i>				
Children > 6	0.332*** (0.096)	-0.138 (0.222)	0.602*** (0.106)	0.129 (0.139)
Child ≤ 6 not in daycare	0.325 (0.177)	-0.110 (0.302)	0.464** (0.142)	0.004 (0.161)
Child ≤ 6 in daycare	0.012 (0.125)	-0.045 (0.276)	0.369** (0.126)	-0.129 (0.150)
<i>3-4 periods post</i>				
Children > 6	-0.032 (0.109)	-0.426 (0.243)	0.388*** (0.115)	-0.267 (0.141)
Child ≤ 6 not in daycare	0.396 (0.238)	-0.022 (0.479)	0.576*** (0.144)	0.088 (0.193)
Child ≤ 6 in daycare	-0.018 (0.154)	0.187 (0.328)	0.279* (0.138)	0.127 (0.196)
Obs.	59,438	29,782	59,438	29,782

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

Table A.4: Heterogeneity by tertiary degree

	Estimated treatment effect of job loss			
	Child care		Housework	
	Weekday (1)	Weekend (2)	Weekday (3)	Weekend (4)
<i>Job loss</i>				
Voc. or academic degree	1.450*** (0.209)	0.490 (0.379)	1.092*** (0.148)	-0.128 (0.204)
No degree	1.160*** (0.104)	0.200 (0.239)	1.886*** (0.100)	0.150 (0.131)
<i>1-2 periods post</i>				
Voc. or academic degree	0.398* (0.165)	0.263 (0.315)	0.558*** (0.160)	-0.209 (0.189)
No degree	0.186* (0.094)	-0.202 (0.207)	0.491*** (0.094)	0.085 (0.117)
<i>3-4 periods post</i>				
Voc. or academic degree	0.204 (0.203)	-0.003 (0.402)	0.433** (0.147)	-0.060 (0.223)
No degree	-0.023 (0.105)	-0.213 (0.234)	0.394*** (0.105)	-0.084 (0.132)
Obs.	59,438	29,782	59,438	29,782

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

Table A.5: Other outcomes

	Estimated treatment effect of job loss				
	Paternal wellbeing (log.) (1)	Maternal outcomes		Household outcomes	
		Working (2)	Full-time (3)	Birth bio. child (4)	State change (5)
2 periods pre	-0.005 (0.015)	0.001 (0.020)	0.003 (0.016)	-0.019 (0.015)	-0.001 (0.007)
Job loss	-0.105*** (0.012)	0.034* (0.016)	0.030* (0.013)	-0.001 (0.013)	-0.001 (0.003)
1 to 2 periods post	-0.046*** (0.012)	0.034 (0.018)	0.019 (0.014)	-0.008 (0.011)	-0.002 (0.006)
3 to 4 periods post	-0.009 (0.015)	0.022 (0.023)	0.040* (0.018)	-0.009 (0.012)	-0.002 (0.009)
Obs.	58,972	56,720	56,720	59,438	59,438

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

Table A.6: Channels

	Estimated treatment effect of job loss			
	Baseline (1)	Partner controls (2)	Child controls (3)	Health controls (4)
<i>Child care weekday</i>				
2 periods pre	0.097 (0.107)	0.096 (0.106)	0.129 (0.119)	0.102 (0.194)
Job loss	1.223*** (0.095)	1.210*** (0.095)	1.215*** (0.100)	1.308*** (0.131)
1 to 2 periods post	0.231** (0.085)	0.221** (0.084)	0.223* (0.090)	0.107 (0.111)
3 to 4 periods post	0.025 (0.098)	0.019 (0.098)	0.014 (0.103)	-0.080 (0.138)
Number of obs.	59,438	59,438	55,171	33,592
<i>Housework weekday</i>				
2 periods pre	0.010 (0.084)	0.009 (0.084)	-0.031 (0.090)	-0.052 (0.115)
Job loss	1.710*** (0.089)	1.701*** (0.089)	1.656*** (0.092)	1.631*** (0.114)
1 to 2 periods post	0.509*** (0.086)	0.501*** (0.086)	0.514*** (0.092)	0.563*** (0.119)
3 to 4 periods post	0.403*** (0.094)	0.398*** (0.094)	0.421*** (0.096)	0.356** (0.128)
Number of obs.	59,438	59,438	55,171	33,592

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

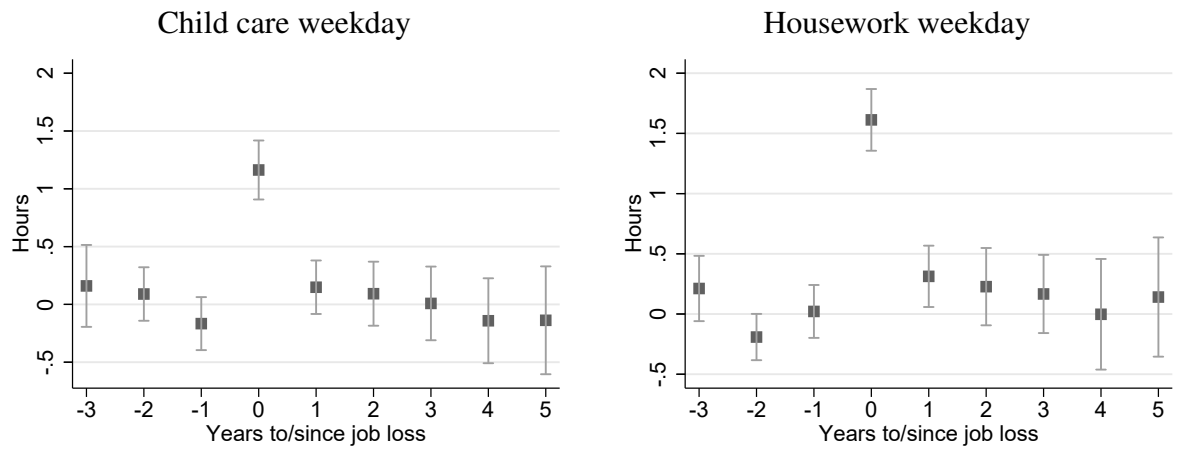
Table A.7: Robustness checks

	Estimated treatment effect of job loss					
	Baseline (1)	Plant closures (2)	Job loss 3 month pre-interview (3)	Excl. not treated fathers (4)	Excl. fathers without partner (5)	Excl. mult. job losses (6)
						Tobit model (no fixed effects) (7)
<i>Child care weekday</i>						
2 periods pre	0.097 (0.107)	-0.099 (0.140)	-0.044 (0.146)	0.083 (0.109)	0.035 (0.105)	0.044 (0.123)
Job loss	1.223*** (0.095)	0.956*** (0.191)	1.185*** (0.143)	1.224*** (0.097)	1.174*** (0.096)	1.156*** (0.119)
1 to 2 periods post	0.231** (0.085)	-0.104 (0.165)	0.097 (0.125)	0.258** (0.093)	0.179* (0.083)	0.200 (0.107)
3 to 4 periods post	0.025 (0.098)	-0.131 (0.160)	-0.110 (0.142)	0.069 (0.119)	0.009 (0.095)	-0.086 (0.115)
Number of obs.	59,438	54,242	55,483	7,117	56,720	57,612
<i>Housework weekday</i>						
2 periods pre	0.010 (0.084)	-0.161 (0.139)	-0.006 (0.135)	0.023 (0.087)	-0.001 (0.085)	-0.056 (0.095)
Job loss	1.710*** (0.089)	1.766*** (0.184)	1.800*** (0.137)	1.705*** (0.090)	1.709*** (0.090)	1.590*** (0.104)
1 to 2 periods post	0.509*** (0.086)	0.251 (0.166)	0.370** (0.134)	0.499*** (0.092)	0.470*** (0.084)	0.392*** (0.100)
3 to 4 periods post	0.403*** (0.094)	-0.004 (0.167)	0.152 (0.141)	0.381*** (0.109)	0.358*** (0.093)	0.271* (0.108)
Number of obs.	59,438	54,242	55,483	7,117	56,720	57,612

Notes: The table reports treatment effect estimates of an involuntary job loss on paternal time allocation. The regressions include individual and year fixed effects and interview and age-group controls. Standard errors clustered on the individual level in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Own calculations based on SOEP v35.

Figure A.4. Robust two-way fixed effects estimation



Notes: The figure plots the treatment effects resulting from the stata command `did_multiplot` based on de Chaisemartin and D'Haultfœuille (2020). Confidence intervals are based on standard errors clustered on the individual level and refer to the 95 percentile.

Source: Own calculations based on SOEP v35.